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The commission's reply: State law, backed up by an attorney general's opinion, requires such bills to be sent, and requires registered mail. Actually, said the commission, the mailings cost only $264 and the total assessment is $330,359.

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Telephony

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December 4, 1954

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★ ★ ★ IN THE ★ ★ ★ NATION'S CAPITAL

by FRANCIS X. WELCH — WASHINGTON EDITOR

Agriculture Department publicizes farm telephone rates . . . reports 44.3 per cent of farms have telephones, as of July 1. Another "utility association objection" raised against Harlan appointment to Supreme Court. REA telephone loan policy reviewed . . . private financing encouraged.

ON NOV. 16 the Agriculture Department gave national publicity to comparative farm telephone rates, for the first time in this reporter's memory. It was in the form of an interim analysis which indicated that farm telephone bills have increased during the year ending July 1, 1954. The basic survey was made by the Agriculture Department's Crop Reporting Board (See other pages for text of the Agriculture Department's release).

According to this analysis, farm telephone bills averaged, over-all, $3.33 a month. This represented a 3 per cent increase over the 12-month period ending July 1, 1953. However, according to the Agriculture Department's release, this was the smallest annual increase in local monthly rates since 1947. Total monthly charges for both local and long distance services averaged $4.92, as compared with $4.95 for July, 1953. For the most part, the increase in local bills was accompanied by an increase in quality of service.

Increases in average telephone bills for local service this year occurred in practically all states, with only the Pacific states showing declines. The Middle Atlantic states (New York, New Jersey, and Pennsylvania) held steady. The South Central and Mountain states showed the greatest increase. As of July, 1954, the highest rates for local telephone service were paid by farmers in the West North Central region.

The Agriculture Department's release of Nov. 16 reported the percentage of farms with telephones, as of July 1, 1954, as 44.3 per cent. This was said to be the "highest on record," compared with 42.5 per cent on July 1, 1953. It was two-thirds higher than 1940.

The comparison of farms with telephones in 1954 made by the department, however, with the previous peak of 1920 is complicated by two facts: (1) The total number of farms has been declining during the past two decades (due to consolidations, migration of farm population, etc.). (2) The use and character of the farm telephone service today, as compared with 1920, has undergone great change.

On the latter point it will be recalled that in 1920 farm telephone service consisted largely of magneto equipment, operated under conditions rather primitive compared with modern rural dialing and common battery service. Again, the 1920 farm telephone predated, to a large extent radio, television, hard highways, and widespread distribution of automobiles and trucks which have made modern-day farms so readily accessible to cities and the farm markets. These collateral developments have acted as a brake on the rapid recovery in the number of farm telephone subscribers, following the drastic fall off in patronage during the farm depression which occurred soon after the record peak year of 1920 (when the farm telephone was the farmers' weather reporter, crop news reporter, and sole link with the outside world during bad weather).

With these factors in mind, one can understand the Agriculture Department's comment that, although the *total number of farms* with telephones as of July 1, 1954, is still slightly less than the U. S. Census figure for 1920, *percentagewise*, however, the total number of farms with telephones as of July 1, 1954, is an all-time record high, as already stated. This is 44.3 per cent as compared with 38 per cent in 1920, the previous peak year before 1950.

A chart which accompanied the Agriculture Department's marketing service release of Nov. 16 showed the following apparent relationship of farm telephones over the past 42 years. These approximate relationships in rounded figures are shown as follows:

Year	*No. of Farm Telephones*	*Percentage of Farm Telephones*
1912	1,900,000	29
1920	2,500,000	38
1930	2,250,000	33
1940	1,600,000	25
1950	2,250,000	41
1954	2,750,000	44.3

Are Lawyers Suspect?

Once more the interesting suggestion that former professional association with a utility company might disqualify a lawyer from judicial or regulatory appointment has been used as an argument to delay, if not defeat, Senate confirmation of an important nomination made by President Eisenhower.

It will be recalled that an objection was registered early last month to the nomination of George C. McConnaughey to the Federal Communications Commission on grounds that McConnaughey's law firm had once served as counsel for the Ohio Bell Telephone Co. in a rate case appeal before the Ohio state courts. Democratic Senators, who were looking around for a stall until they have a chance to organize the next Congress, decided to defer McConnaughey's appointment on grounds that it was "controversial." It is still generally expected that McConnaughey's appointment will be confirmed in the Senate of the 84th Congress, which meets next January. Meanwhile, he continues to serve as FCC chairman on the basis of an interim appointment, which will be good until the Senate can act on McConnaughey's formal nomination.

Standing by itself, this objection to McConnaughey's past professional af-

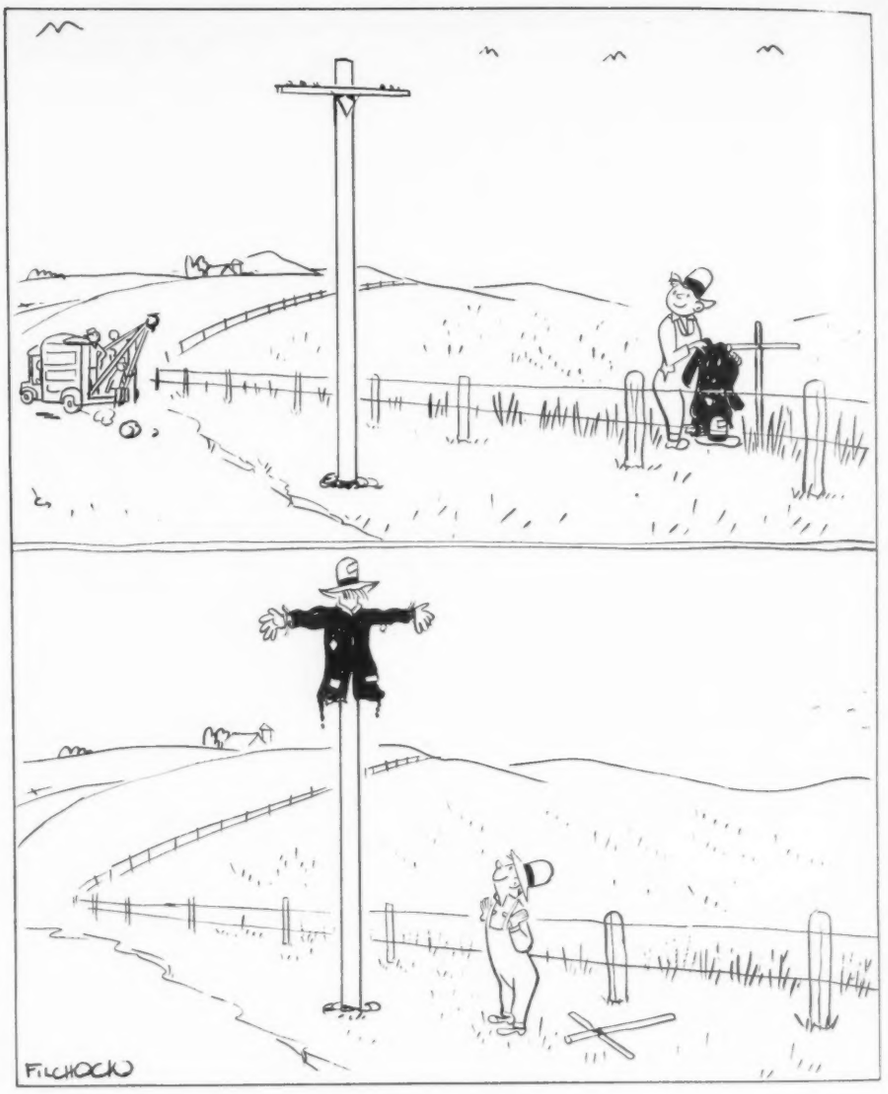
filiation would not be worth more than passing mention as a rather unusual reason for denying an otherwise qualified official the right to serve on a federal regulatory commission. But a similar objection, registered against the nomination of U. S. Circuit Court Judge John Marshall Harlan, to the vacancy on the U. S. Supreme Court, raises the question whether former professional affiliation with a utility company could be getting to be a stock argument against the right of a judge to serve on the federal bench. Harlan's nomination has also been labeled "controversial" and has been put over until the next session of Congress, when the Democratic Senate will doubtless recommend confirmation.

It would be giving too much weight to this objection based on former utility company affiliation to say that it was the real reason for the delay on the Harlan nomination. President Eisenhower strongly recommmended the immediate confirmation of Judge Harland to the vacancy on the highest court created by the recent death of Justice Robert H. Jackson. As a matter of fact, President Eisenhower's selection of the distinguished New York jurist—John Marshall Harlan—with his exceptional qualifications and rich background, had won almost universal acclaim, regardless of party politics. And when the Senate Judiciary Committee decided to delay confirmation, there was a good deal of editorial criticism in the press, even from newspapers which have not always been favorable to the administration.

The so-called utility association objection to John Marshall Harlan was among several which the Senate Judiciary Committee Counsel Sourwine listed from the file. Sourwine explained to the press that the committee had received "a letter from a man who apparently had a personal feud with the American Telephone & Telegraph Co.," which raised the question of some work which Harlan's law firm had done for a telephone company. This sounds very similar to the arguments raised against McConnaughey.

But there were some other objections, almost laughable in their implications. One objection was to the effect that John Marshall Harlan was a Rhodes scholar. This should cause Senator Fulbright (D.) of Arkansas some amusement, if not reflection. Another objection was that Harlan had been active with the affairs of the Atlantic Union, a group seeking to foster closer ties between nations of the Western World.

But cynical Washington observers realize that all these objections amounted to so much camouflage. The real objection came from Senator Eastland (D.) of Mississippi, who has been critical of the U. S. Supreme Court's unanimous opinion in the controversial school segregation decision. Chief Justice Warren wanted the court at its full strength before it takes further steps in carrying out the order against school segregation. But because Harlan's nomination was delayed, the court has extended the time on supplementary proceedings in the school segregation case. It does not take a political genius to know what the southern Senators were really interested in.

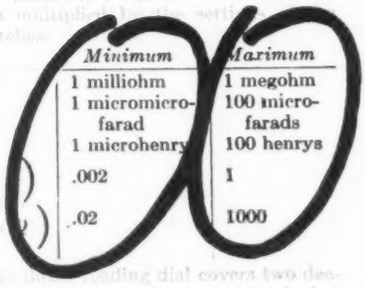


But, such tactical maneuvers to one side, the idea that a man who has ever earned his living working for, or been retained professionally by, a public utility company, should be barred from regulatory appointments or judicial appointments is a novel one. In the cases of McConnaughey and Harlan, it was not even suggested that the nominees had personally been associated with public utility representation. The "guilt by association"—if that is what is intended—is carried one step further.

The actual association in both cases was traced to the activity of the law firm with which the nominees were merely associated at one time. Most large law firms these days manage to get into a public utility case, in one form or another, over a long-enough period. So, if this line of reasoning is carried to its extreme conclusion, a good many of the most able members of the bar would find themselves under a cloud as far as further opportunity for public service is concerned. When we stop to think that large old firms, such as Sullivan & Cromwell of New York City, employ literally hundreds of the very ablest attorneys, we can see that such qualifications would be quite far-reaching.

It is true that we have, in this country as a matter of policy, been placing a barrier on qualifications for public servants in other respects. People who are Communists, for example, are being barred from public employment, teaching school and other positions of trust or security. May be this so-called

(Please turn to page 68)



Minimum	*Maximum*
1 milliohm	1 megohm
1 micromicrofarad	100 microfarads
1 microhenry	100 henrys
.002	1
.02	1000

Those Troublesome Prefixes

By L. N. Martin

IN TELEPHONE WORK it is often convenient to use units of measurement that are smaller than or larger than the standard units. These units are named by placing a prefix before the name of the standard unit, e.g., milliampere (0.001 ampere), kilocycle (1,000 cycles), microfarad (0.000001 farad), etc.

Unless these prefixes and their meanings are firmly fixed in the mind of the user he will make serious errors. In fact we often see such errors in print.

During the long distant past, the English language has received many words and parts of words from the much older Latin and Greek languages. For instance, "micro" comes from a Greek word which means "small," whence we have "microscope," an instrument for viewing very small objects; "micrometer," an instrument to measure very exactly the thickness of material, and "microwave," a very short wave length used in radio.

It is thus easy to remember that as "micro" is used to indicate something that is very small, it also means 0.000001 which is the *smallest* division of a unit in common use.

English speaking people often confuse "milli" with our word "million." This is wrong. "Milli" means 1/1000 *not* 1/1000000.

These prefixes are derived from the metric system of measurements and are well understood in countries where the metric system is in common use. However, people in this country and in England are not so familiar with the metric system.

We hope that what follows will help the reader to remember the significance of these terms.

Latin prefixes are used for the decimal fractions of units as follows:

Deci	1/10	0.1	10^{-1}
Centi	1/100	0.01	10^{-2}
Milli	1/1000	0.001	10^{-3}
Micro	1/1000000	0.000001	10^{-6}

The following may be useful as an aid in remembering the above.

From deci we get our word dime (1/10 of a dollar).

From centi we get our word cent (1/100 of a dollar).

From milli we get our word mill or mil (1/1000 of a dollar or 1/000 of an inch).

Some of these units that are frequently used by telephone people are:

Milliampere. 0.001 ampere. For measuring small currents.

Millivolt. 0.001 volt. For measuring small voltages.

Milliwatt. 0.001 watt. For measuring small amounts of power, especially in transmission work.

Microfarad. 0.000001 farad. The most commonly used unit of capacity. (The farad is too large a unit to be convenient for telephone work.)

Micromicrofarad means 1/1000000 of 1/1000000 of 1 farad.

Microvolt. 0.000001 volt. For measuring small voltages.

The larger or multiple units are designed by Greek prefixes as follows:

Deka	10	
Hekto	100	10^{2}
Kilo	1000	10^{3}
Meg or mega	1,000,000	10^{6}

Some of the multiple units which should be very familiar to every telephone man and which should aid him in remembering these prefixes are:

Kilocycle. 1,000 cycles. Used to designate carrier and radio frequencies.

Kilowatt. 1,000 watts. The unit of utility power.

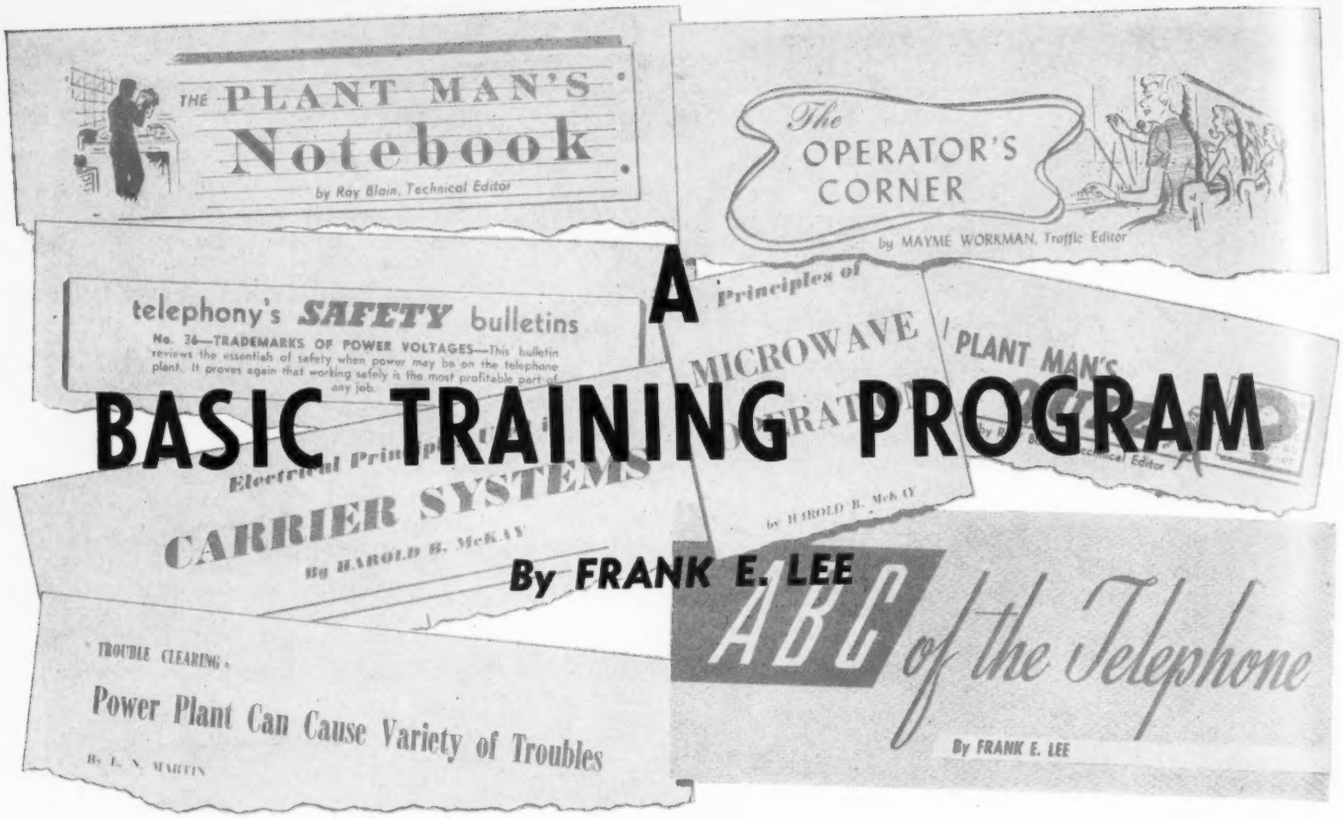
Kilovolt. 1,000 volts. Used with reference to high voltage power lines.

Megacycle. 1,000,000 cycles per second. Used in high frequency radio work.

Megohm. 1,000,000 ohms. Used in measuring a very high resistance or insulation.

Also notice "megger," an instrument measuring very high resistances.

Our tables also show the fractions and multiples expressed as positive or negative powers of 10. This notation is useful when making calculations by means of logarithms.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No. 36—TRADEMARKS OF POWER VOLTAGES—This bulletin reviews the essentials of safety when power may be on the telephone plant. It proves again that working safely is the most profitable part of any job.
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PLANT MAN'S
CARRIER SYSTEMS
By HAROLD B. McKAY
TROUBLE CLEARING
Power Plant Can Cause Variety of Troubles
ABC of the Telephone
By FRANK E. LEE

A BASIC TRAINING PROGRAM

By FRANK E. LEE

RECRUITING new employes and keeping them in the telephone business isn't as easy today as it was a few short years ago.

This by no means is an indictment of the telephone industry. Instead it is just a natural course of events in this changing world. Instead of an indictment it is a challenge to the industry to make a telephone job and a telephone career sparkle with the same attractiveness and glamor as a career in electronics, chemistry, aviation, or atomic energy.

Some years ago the sailor's life was the envy of all young men planning a career. Then came railroading, with ribbons of steel and iron horses muscled with steam that carved empires out of wilderness, with its strong attraction for men with vision and ambition.

Next came the age of automobiles and telephones, each with its own brilliance and inspiration. But their days of glory and romance have already stopped firing the imagination of young men dreaming of a career. We are in an era of powered flight and electronics, and astounding possibilities of the atomic age are clamoring for attention.

What does this mean to the individual telephone company?

Essentially, all of this means that the telephone company may have to dig a little deeper to find the people it needs to meet its ever increasing demands for service. Not only will the telephone company have to work a little harder to find the people it needs, but also the necessity of holding the employes it already has assumes increasing importance.

One of the things a telephone company can do to make the telephone job more interesting and attractive is to develop an adequate, progressive training program. The importance of this fact very often is overlooked in the plans a company makes to develop interest and initiative in its employes.

The better the job that the telephone company can do in helping employes understand the telephone business, the more satisfied employes will be. This applies to the Independent telephone company just as much as it does to a Bell company.

The problem of training is a basic problem of the telephone industry. Just how well the problem is solved depends to a great extent on the initiative and effort put forth by each company and each individual who participates in a program designed to solve the problem.

There are a great may things to learn about the telephone business. There are new ways of doing common ordinary jobs, and there are new tools to use. Every year can be marked by the development of many new pieces of apparatus and circuits. A large number of small companies will want to use and take advantage of these new ideas—and that means continual employe training.

All of this means that even experienced people in the industry must be constantly on the alert to learn and keep pace with the new things that come along. This continual progress towards better things is good for the industry and it's good for the people in the telephone industry, too.

Many of the new ideas, the new materials, or the new apparatus, are quite easy to understand. In many cases the changes or improvements are nothing more than refinements on the things already in use. Fortunately, most of the new ideas that come into the telephone industry fall into this category. The primary reason for this condition lies in the fact that the new developments must be designed and engineered to fit in with telephone plant and equipment already in use. Thus, learning the new idea comes easy because it is based on what is already known.

Using knowledge that is already known is closely allied with taking advantage of background information or of a broad understanding of a subject. Basically, how best to attain a broad understanding of the background information that is tied in with the telephone business is one of the challenging questions confronting every telephone company today, whether it be one of the Bell companies or one of the

many fine Independent companies in the industry.

Both of these groups, Independent and the Bell, have similar problems. One may have greater resources to invest in a training program, but that in itself does not guarantee a good training program. The success of any training program can be measured on how well a company and, even more important, how well each individual person takes advantage of the opportunities to learn.

This important consideration about the art of learning is not peculiar to the telephone business alone. It is one of the bulwarks of the foundation of the American way of life. Visit any of the large universities and ask for a list of those who are outstanding students. Invariably, the answers will reveal that those who rank the highest in any class are the students who are taking advantage of every opportunity to learn.

What can a small company do about training?

To do any job or to accomplish any goal, a person or a company must have these three basic ingredients:

(1) The will to do a job.
(2) An objective in doing a job.
(3) Knowledge of the proper way to do a job.

Where training is concerned, the first requirement of having a will to do a job is divided about evenly between the company's desire to provide the material from which an employee can learn and the individual's desire to learn all he can from the material.

As far as the objectives are concerned—they again become two-fold. The company should look upon training as a means to do a better and more economical job of providing service to its customers. In addition, the company is bound to benefit by loyalty that generally develops in those who receive the consideration of adequate training.

From the standpoint of the individual, an objective of training should be the development of a better understanding of the business. A greater sense of belonging to the business goes hand in hand with a well rounded knowledge of the things that make for good telephone service.

The third of the required ingredients is to have a way to do the job. Primarily the way to do a training job is concerned with what can be used to provide the training so a person can learn as easily and as rapidly as his ability permits.

The everyday skills that are needed to install a telephone, erect a pole line, place a drop wire, trim a tree, etc., can be learned almost as fast by working with an experienced person in the field under actual conditions, as they can under the simulated conditions that would be provided in the classroom by a larger company. Based on informal discussions and comments, the supervisors of some of the more elaborate training schools believe the average student does well if, in the school, he can acquire as much as 20 per cent of what he eventually should know about his job. If the same student or new man spent the same amount of time with an experienced man in a small company area he probably would learn from 10 to 15 per cent of his total mechanical job knowledge. In addition, the on-the-job training would give the small company student the valuable benefits of experience under actual field conditions.

A logical conclusion is that when it comes to learning the mechnical part of the job the man in a small company doesn't have to take a back seat to anyone. However, there is more to training and more to the telephone job than just learning the mechanical side of the job. Of equal, or perhaps greater importance, is the development of background knowledge that will add to a clear understanding of all parts or phases of the job. This kind of information helps a man to think out the solutions of his own problems.

Typical questions in the minds of people who are new to the telephone business are:

(1) Why should a job be done in a particular way?
(2) What makes a piece of apparatus work?
(3) How can trouble be located in the quickest and easiest way?

Providing the answers and information for this second part of the training program will require a longer period, and as was mentioned earlier,

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training of this sort can continue all during a person's telephone career. From the small company's standpoint the important thing is to help the new man progress and develop as rapidly as possible.

Where can the necessary training material be secured?

This question has been asked many, many times and actually there is no one place where a person can get all the necessary information from one source. However, if the small company will assist all of its employes in securing what is on the market today, a practical and valuable training course can be developed.

Here's a Low-Cost Program

Actually, the training materials which will be discussed in the following paragraphs, provide a basic low-cost program that will prove valuable to any company, small or large. In addition it is a program that is easily within the reach of any individual who is anxious to read and study during a few of his spare hours.

A trade paper, like TELEPHONY, is a splendid source of training material. Here are examples of the training material that appeared in a recent single issue of TELEPHONY:

➔ *The Plant Man's Notebook.* A regular weekly commentary on things that are new in the industry. Every plant man will find things of interest and new ideas in the Notebook.

➔ *Plant Man's Quiz.* Questions from operating people all over the country are answered in the Plant Man's Quiz. It's a splendid source of review for anyone in the industry.

➔ *The Operator's Corner.* This is a regular feature of TELEPHONY and is written especially for the operators and all the people in the traffic department. Several pertinent traffic questions are answered each week.

➔ *In the Nation's Capital.* A regular weekly report from Washington which keeps telephone people currently informed of legislation and regulatory actions affecting the business from which they earn their livelihood. It is must reading for all—in both large and small companies.

The feature articles appearing in this same issue were:

➔ *"Factors in the Selection of Telephone Carrier Systems."*

➔ *"Cheerfulness is Contagious."*

➔ *"Trouble Clearing in the Power Plant."*

➔ *"ABC of the Telephone—Part 72." (How to Read Circuit Drawings —Air Line System.)*

The titles of these articles suggest the broad scope of training material that is available in a single issue of this magazine.

New Products Section

In addition to special features and articles, TELEPHONY has a section devoted to new product announcements that keeps its readers informed on new developments that may answer particular problems in any given operating company.

Ads Provide Add Up-To-The-Minute Material

The advertisements that appear every week in TELEPHONY offer another good source of training material. The ads not only provide description of telephone equipment and apparatus, but they also contain information on booklets and instruction material that are available, usually for the asking from the various manufacturers.

For these reasons, a regular subscription to TELEPHONY, paid for by the company and sent directly to the home of every employe is one part of the training program that can be developed from material on the market today.

The books, the "ABC of the Telephone," (in two volumes) are another important part of the training program. The ABC books are reprints of the series of articles, "ABC of the Telephone," that have been running in TELEPHONY since 1944. In this way these articles are readily adaptable to classroom or home study activities.

Actually, the "ABC of the Telephone" series originated in 1942 as a telephone training course in the Engineering, Science, and Management War Training Program, sponsored by the United States Office of Education and conducted by the Illinois Institute of Technology. The editor of TELEPHONY, Ralph C. Reno, recognized that this material should be made available to all the industry, and thus the ABC series came into the pages of TELEPHONY.

From the very beginning the primary purpose of the ABC articles has been to present the technical aspects of the telephone business in as simple and as straightforward a language as possible. The articles have been written for the man in the field, to help him to better understand how the telephone and related apparatus works.

The first 40 ABC articles are included in the two ABC bound volumes currently available. (Vol. 3, containing later articles, will be available soon.) The articles start with the basic topics of how transmitters, receivers, induction coils, capacitors, anti-sidetone circuits, etc., work. Working up from these are articles on fault locating, installation of station protectors, subscriber station installation, cross-talk and transmission developments, etc.

The ABC books are a good source of training material to help develop a broad background for a telephone career. In addition they contain a wealth of specific information on a large number of subjects adaptable to the everyday job. For these reasons, it is suggested that at least all plant employes be given personal copies of the "ABC of the Telephone" booklets as the second part of this ready-made training program.

For specialized training on cable splicing and maintenance techniques, an 80-page reprint of articles on this subject by Daniel Seitz is available from TELEPHONY and it is highly recommended. This is a book that is well illustrated and that tells how the cable splicing job should be handled. It is suggested that each man engaged in cable splicing or cable maintenance be provided with a copy of this cable book.

Another specialized series of articles are the ones on "Electrical Principles Used in Carrier Systems," by Harold B. McKay. These articles have been reprinted under one cover and are available from TELEPHONY. The articles are an important contribution to the training literature that is available on this highly technical, fast-growing phase of the telephone business.

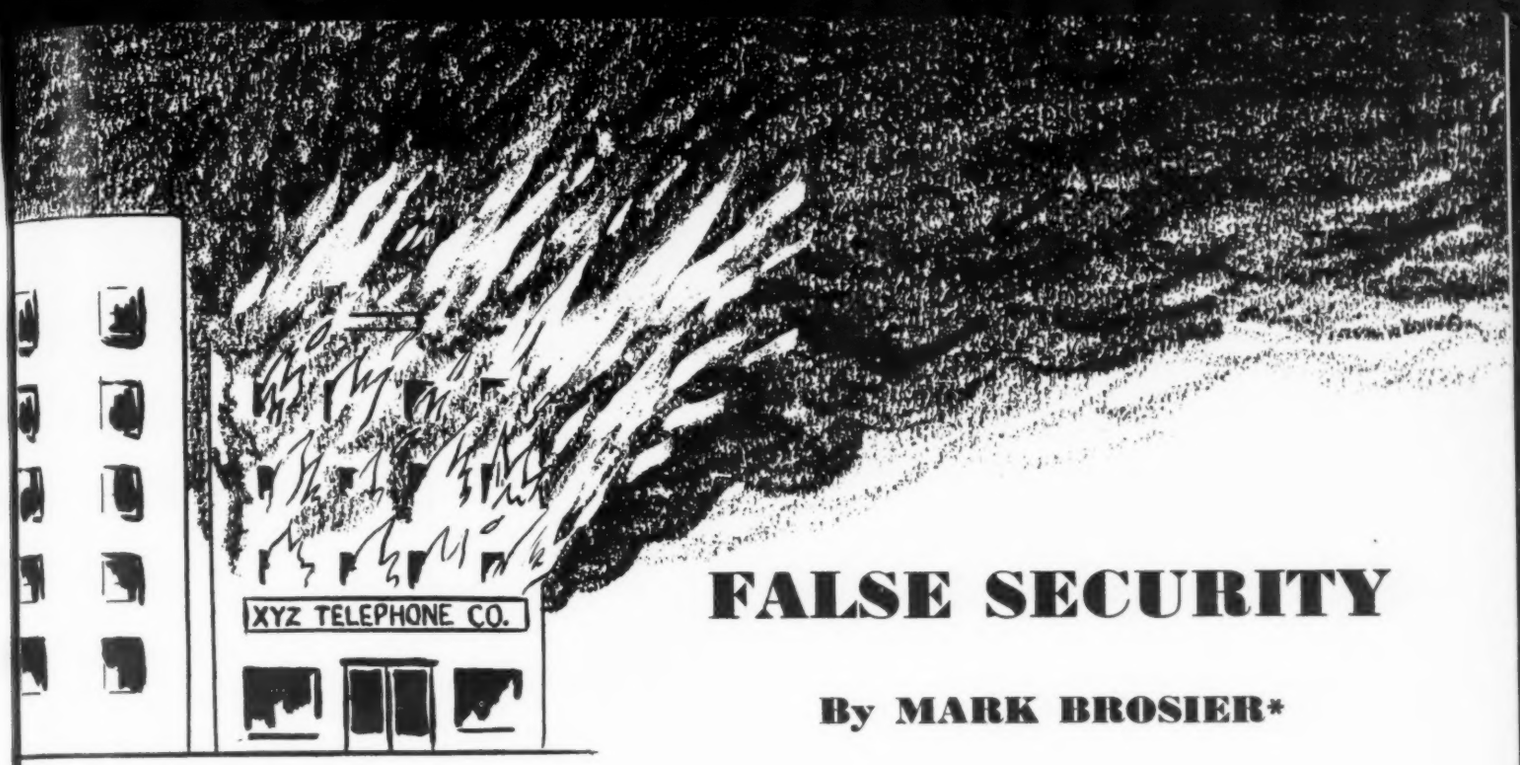
Still another TELEPHONY series which should be in the hands of all employes is the one entitled "Glossary of Telephone Words and Terms," by Emerson C. Smith. These articles have been reprinted under one cover to form the only telephone dictionary on the market.

Where Should Training Take Place?

The kind of training program that is suggested in this article is somewhat different from that which would be conducted in a school classroom. In this program it is assumed that the student or learner has a desire to learn more about his job. He has a desire to prepare himself for the many good things that a telephone career has to offer. On this assumption it is believed that a combination of on-the-job plus off-the-job training will have the most widespread advantages. A grading system is not included in the plan because it is not necessary.

In the small company on-the-job training may be a combination of lecture and discussion sessions. In this respect, many of the illustrations in the ABC series were developed, originally, as blackboard sketches during the progress of a lecture or general discussion period. These sessions can be held on a basis of an hour or an

(Please turn to page 71)



FALSE SECURITY

By MARK BROSIER*

THERE are thousands of dollars spent each year for fire extinguishers that are totally unfit and inadequate for the job they are expected to do. This type of equipment gives a sense of security to the purchaser who does not know the facts. This is false security!

Many small automatic telephone exchanges are now operated on an unattended basis. These systems usually have no fire protection. Automatic central office equipment requires automatic fire detection and extinguishing methods to be safe. By careful planning and the use of proper fire extinguishing equipment, fire safety can be reasonably assured.

However, ample fire detection and extinguishing facilities are more of a "must" in manually operating exchanges because of the human life element and all telephone companies should see to it that they have adequate and dependable fire protection equipment available in those exchanges.

What is fire? Fire may be defined as rapid oxidation with the evolution of light and heat. Combustion in its broader sense includes not only the process of chemical combination with oxygen but also combination with chlorine and various other substances.

Fire can continue only where there are present fuel, oxygen from the air or other source, and a sufficiently high temperature to maintain combustion. Extinguishment can be accomplished by the elimination of any one of the three factors: By removing the fuel, by excluding the oxygen (smothering) or by reducing the temperature.

Ignition of a combustible material occurs only where there is a sufficiently high temperature and a sufficient quantity of oxygen to initiate self-sustained combustion.

Fires are classified according to the characteristics of the material involved. The three classifications are:

Class "A." Fires in ordinary combustible materials when the quenching and cooling effects of quantities of water, or solutions containing large percentages of water, are of first importance.

Class "B." Fires in flammable liquids, greases, paints, gasoline and all materials whose vapors burn and where a blanketing effect is essential.

Class "C." Fires in "live" electrical equipment, where the use of an electrically non-conductive extinguishing agent is of first importance.

Fires are extinguished by cooling or smothering the burning material. Water extinguishes fire by cooling below the ignition temperature; foam, primarily by forming a blanket, excludes oxygen; carbon tetrachloride or chlorobromomethane by forming a blanket of inert gas which excludes oxygen and to a limited extent by cooling; carbon dioxide (CO_2) by displacing the oxygen in the air, or by diluting it to a concentration which will not support combustion; and certain dry powdered materials by smothering.

Fires vary in size, intensity, rapidity of spread and accessibility. These factors influence the selection of the proper extinguisher to be used. Fires in different classes of materials require different extinguishing methods.

Carbon dioxide is particularly adapted to the protection of electronic or communication equipment. This extinguishing medium involves engineering problems of a specialized character, and successful performance may be dependent on apparently minor details of installations. The character and location of discharge outlets are of primary importance.

Carbon dioxide extinguishers contain liquid carbon dioxide under a pressure of 800 psi. to 900 psi. at normal room temperature. The extinguisher consists basically of a pressure container, a valve for releasing the gas and a means of effectively applying the carbon dioxide on the fire. A tube extends from the valve to the bottom of the extinguisher so that only liquid carbon dioxide reaches the discharge horn until about 80 per cent of the contents have been discharged (at normal temperatures), in the form of dry ice or snow, after which gaseous carbon dioxide is discharged.

The discharge device for these extinguishers consists of a horn at the closed end of which is an orifice from which carbon dioxide is expelled. The horn surrounds the jet of carbon dioxide at the point at which the velocity is very high and prevents air from being entrained to dilute the stream and reduce its effectiveness. By the time the carbon dioxide stream has reached the open end of the horn, the velocity has been reduced to a point at which no important amount of air is entrained. The horns are either directly attached to the extinguisher valves or attached through swing joint connections on extinguishers of capacities up to five pounds, but on large sizes the horn is attached to the end of a hose capable

*Mr. Brosier is supervisor of Firemanship Training, Engineering Extension Service, Iowa State College.

of withstanding high pressures. In the case of fixed systems, rigid piping is used to the horns.

It is important that only approved equipment be used. Detailed requirements for installations and maintenance of these systems are given in the National Fire Protection Standards for Carbon Dioxide Fire Extinguishing systems (N.F.P.A. No. 12). This may be obtained from the National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass.

Carbon dioxide gas is more effective if applied very promptly, before fire has been burning long enough to heat objects enough to create danger of re-ignition. Automatic control is desired.

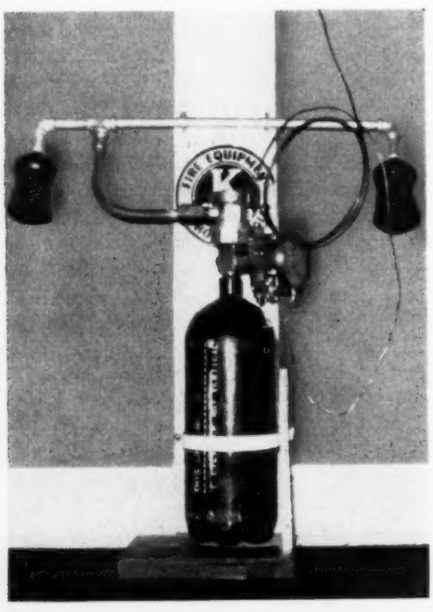
The supply of CO_2 gas required for flooding systems should not be less than shown in the following below.

A supply of carbon dioxide gas should be available for delivery within spaces protected of not less than one pound of compressed gas for each 22 cu. ft. For spaces up to 1,600 cu. ft. the net volume of gas should not be less than shown in the following table:

Volume of Space (Cubic Feet Net)	Carbon Dioxide in Pounds
100	7.5
140	10
220	15
300	20
375	25
500	35
800	50
1,100	70
1,600	100

For protected spaces larger than 1,600 cu. ft. the volume of gas should not be more than the following:

18 cu. ft. per pound of gas up to 4,500 cu. ft. space protected.



Kidde small automatic carbon dioxide fire extinguishing system with horn.

C-O-TWO 10-pound squeeze-grip hand portable fire extinguisher carbon dioxide type.

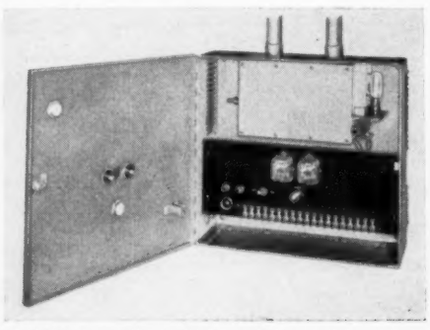
20 cu. ft. per pound of gas up to 50,000 cu. ft. space protected.

22 cu. ft. per pound of gas over 50,000 cu. ft. space protected.

(These figures are inclusive.)

Inspection departments having jurisdiction should be consulted in each case as to the minimum amount of gas to be required.

Automatic CO_2 systems combine fire detecting and fire extinguishing. Rate-of-rise detectors, fixed temperature thermostats or fusible quartz links provide a selection of reliable watchmen for particular hazards. Completely mechanical, they do not make mistakes, they have no fear of fire, they act automatically, quickly and effectively. This equipment not only detects the fire but also sets the extinguishing system in operation. It may also operate devices for shutting down fans, closing doors and covers.



C-O-TWO smoke detector. One or two space double circuit audible type ID-1.

All have a proper application— are used to provide maximum protection. A sudden rise of temperature discharges the carbon dioxide which is not injurious to electrical equipment.

The cost of an automatic CO_2 system depends on the size of the room to be protected. The cubic footage determines the amount of carbon dioxide. A small unattended automatic central office could be installed with this highly efficient fire protection equipment for approximately $600.

The following general rules are equally applicable to all types of first aid extinguishers:

(1) Persons who may have occasion to use any extinguisher should have knowledge of the proper way to use the device effectively.

(2) The instructions of the manufacturer of the extinguisher as to charging, maintenance and operation should be followed exactly.

(3) All extinguishers should be examined at least once a year to determine positively that they are in operating condition.

(4) Frequent inspections should be made to determine that extinguishers are in their designated places, are readily accessible, have not been injured or tampered with, and that nozzles are not clogged.

(5) First aid fire extinguishers are designed for use on fires in their early stages and cannot be expected to be fully effective if applied after a fire has spread to involve a large quantity of combustible material. Ready accessibility of extinguishers so that they may be used with a minimum of delay is of major importance.

Chemical type extinguishers which leak or are damaged should be discarded or returned to the manufacturer for repair. Do not try to repair extinguishers which are badly corroded

(Please turn to page 71)

Kidde small first aid manually operated carbon dioxide fire extinguisher.

telephony's *SAFETY* bulletins

NO. 38 — MOTION PERCEPTION — A KEY TO HIGHWAY SAFETY

SAFETY—This bulletin presents a new approach to safe driving on today's busy highways. You'll find it an aid on short jaunts as well as on longer trips.

by FRANK E. LEE

MOTION PERCEPTION may not be a new idea, but it may be one answer to the problem of how to reduce highway accidents. What is "motion perception?"

Motion perception basically is the ability to judge the speed of a moving vehicle with another moving vehicle or a stationary object. Properly judging distances and speed of travel are two of the primary requirements of every safe driver.

Without taking undue chances anyone can determine how well he rates when it comes to motion perception. The critical areas of motion perception are when on-coming vehicles are from one to two blocks away from your car which is travelling in the opposite direction. When the other vehicle is within this area the driver should be able to determine at a glance the place along the highway where the two vehicles will pass.

Try it out the next time you are on the road. Here's all you have to do.

(1) When the approaching car is within a quarter mile away, quickly pick out a line on the road or spot along the highway to mark where you estimate the two vehicles will pass.

(2) How well did you do?

Try this check at various speeds and at different times on any drive. Soon you'll be aware of how your judgment of motion perception will aid in your driving.

After you've tried the check with on-coming cars, try it with cars that are overtaking you from the rear. This time your perception of the motion of the car in the rear should be based only on your view of the car through your rear vision mirror from two quick glances in it. Pick out the spot on the road ahead and see just how good you are.

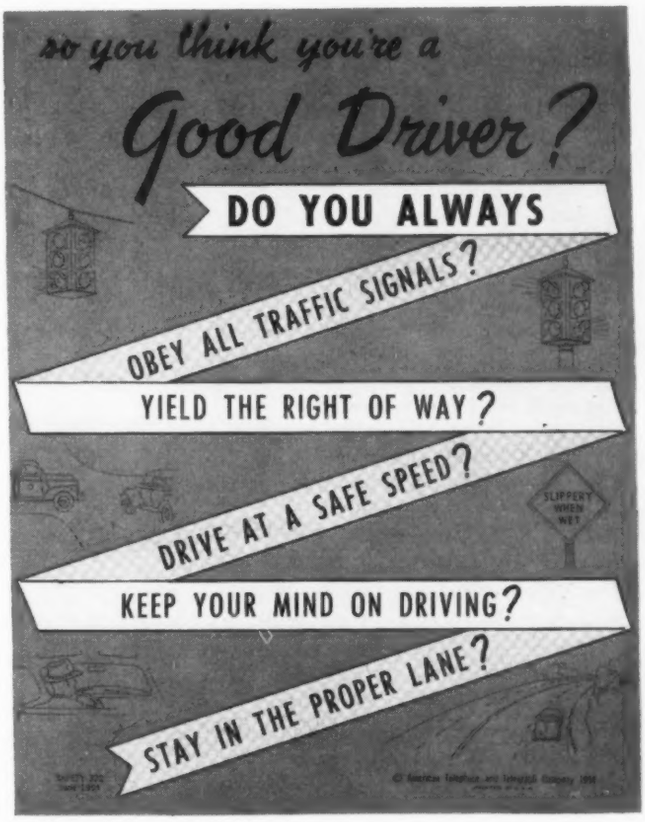
This by no means is intended to be a contest. Instead it is suggested only as a means by which any driver can check his judgment of speed and distance, the combination of which we have labelled "motion perception."

Skill developed in such motion perception along a straight highway also aids in judging the approach of vehicles on side roads or at corners. In this case when in doubt *always give the right-of-way.*

It must be considered that conditions will change the accuracy of the motion perception of any given driver. For instance, fog, rain, and similar outside influences can disturb the accuracy of this faculty. In this respect some authorities believe that tinted glass is a detriment to accurate motion perception, especially when driving at night.

The effect on motion perception caused by outside influences is easy to recognize. The answer to safe driving is equally simple—slow down.

Now, let's consider the change in motion perception which may occur within the driver himself. Basically, this has to do with the driver's apparent sense of motion as he moves along the highway.


so you think you're a
Good Driver?
DO YOU ALWAYS
OBEY ALL TRAFFIC SIGNALS?
YIELD THE RIGHT OF WAY?
DRIVE AT A SAFE SPEED?
KEEP YOUR MIND ON DRIVING?
STAY IN THE PROPER LANE?
SLIPPERY WHEN WET

Does he have the feeling that he is in motion and that the highway and things by the side of the highway are stationary?

Or does he have the feeling that the vehicle is more or less stationary and that the highway is moving underneath and objects are moving from front to back along the side of the road?

This false impression constitutes a dangerous shift in motion perception that is a basic cause for many of the serious accidents that occur on our highways. When this shift in perception occurs the driver has the feeling that the vehicle is floating along the highway. Some drivers say they feel as though the vehicle is hung on a string and merely shifts from side to side to negotiate curves on the road.

Let me state here that this shift is not always a result of fatigue, and for your own safety don't assume that your motion perception is 100 per cent just because you are not physically tired. Instead train yourself to be aware of the condition and then do something to help yourself regain your proper motion perception. You will be a safer driver as a result. Here is what you can do:

(1) Stop driving and relax a while.

(2) If possible, a change of drivers for a time is highly recommended.

(Please turn to page 83)

THE PLANT MAN'S Notebook

by Ray Blain, Technical Editor

WE HAVE received a letter from Harry E. Chapman, equipment supervisor of the Intra State Telephone Co., Galesburg, Ill., in which he presents some very good ideas on the cleaning of central office equipment. He states in part as follows:

"We tried compressed air to clean equipment only once. We soon learned that harmful dirt was blown into the armatures of relays and in some cases wires were actually blown loose. We even used a canvas tent to confine the air stream to one bay of equipment at a time, but soon abandoned the entire idea.

"We now utilize various types of brushes and a vacuum cleaner for the cleaning of equipment. This work is performed by a boy on a part-time basis, after school and on Saturdays.

"We make use of 'KEX,' a patented dust cloth on our floors and frames. We have found that this cloth picks up more dirt and lint from the floors than we could with our 5 HP vacuum cleaner. The ducts for this vacuum cleaner are piped throughout the building. The dust cloth polishes as well as cleans, and requires very little wax.

"We have also learned that a heavy coat of wax on the floor will create a dust hazard. Small wax particles will loosen from walking on a floor and these will float through the air and lodge in the equipment and cause trouble. We now use wax sparingly to seal the tiny pores in the terraza and asphalt tile flooring. Since adopting this method, our dust problems have been greatly reduced."

• • •

The writer's long time friend, W. A. Chapin, Washington, D. C., representative of the Automatic Electric Co., retired recently after over 44 years service with that company.

We have known and worked with Mr. Chapin through a couple of wars and two depressions, and have never known him to lose his temper or even indicate impatience with anyone. To keep smiling for such a long time in Washington, a man *must* have a good disposition.

E. E. McCorkle has been transferred from Chicago to take over the direction of the Washington office for the Automatic Electric Co.

• • •

We are advised by Herman H. Wagner, manager of the Prattsburg (N. Y.) Telephone Co., that he is presently receiving numerous requests for individual line service. These requests come from rural areas as well as towns. This trend is not surprising as people are now using the telephone more than ever before and many of them are finding party line service inadequate.

Perhaps the majority of operating telephone men consider that eight-party rural service is adequate and excellent. Actually, many lines are more heavily loaded and perhaps in the majority of cases are providing adequate service.

We are firm in the belief, however, that as people are educated to value good telephone service and make proper use of it in the future, four-party rural lines will be in the majority.

• • •

We had the pleasure recently of hearing Gen. Matthew B. Ridgway, Chief of Staff, United States Army, speak before the National Security Industrial Association, in Washington, D. C., on how we are preparing for future wars. He had the following to say with reference to communications:

"Greater dispersion and mobility, in turn, place greater emphasis upon reliable communications of greater range and power, and of maximum compactness. Thus, the search for better communications goes on continually.

"I might mention at this point what I have heard was the latest project of the Army Signal Corps. This perhaps properly belongs in the category of unconfirmed rumor. It seems that the Signal Corps is developing a bird that is a cross between a carrier pigeon and a woodpecker. This bird will not only deliver the message, but knock on the door also.

"I have not verified that particular project, but I can give you as an example of the army's forward looking approach in this field the research being conducted in the tactical use of television. Recently, tactical television was tested in the spring maneuvers at Ft. Bragg, and demonstrated last month over the NBC network. We intend to leave no avenue unexplored in profiting from the technical and inventive genius of American industry and science. Often in the past, as well it may again in the future, the precious margin of victory was gained by virtue of the superiority in quality and design of the weapons and equipment possessed by the victorious side."

• • •

We are in receipt of a letter from the Superior Cable Corp. of Hickory, N. C., advising that they are now in production on a line of plastic-insulated, plastic-sheathed cables from six to 202 pairs in 19, 22, and 24 gauge. Further, they are also producing substantial quantities of a six-pair, 19 gauge rural distribution cable.

The company has prepared a handbook on rural distribution cable which provides information on construction practices, sag and tension data, buying, splicing, terminals, protection, and transmission.

• • •

We are in receipt of a letter from Bill Channel inclosing pictures showing how a 12-year-old girl at San Gabriel, Cal., installed one of the 11-pair Channel cable terminals on a 26-pair cable in just 37 minutes.

This is certainly a record even for California. We wonder what Texans can do?

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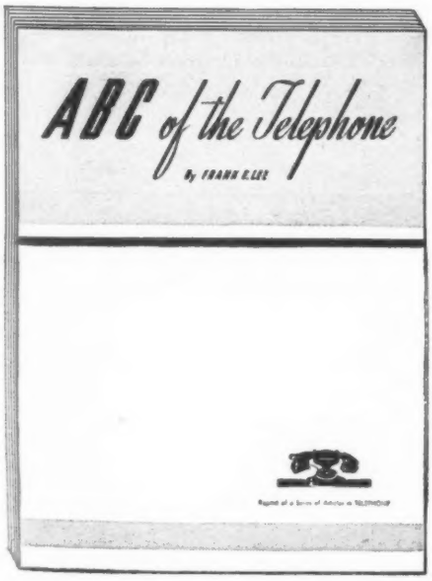
WRITE FOR CATALOG IF YOU DON'T HAVE IT

★ ★ ★

Suttle Equipment Co.

Phone 782-783 **Lawrenceville, Illinois**

VOLUMES I & II OF "ABC OF THE TELEPHONE" NOW AVAILABLE



Both Written in the Telephone Man's Language

Volume I is an 84-page booklet of 21 installments of the popular series by Frank E. Lee, appearing currently in TELEPHONY. Includes circuits, transmitters, receivers, induction coils, generators, ringers, relays, line protection, dials, automatic switching, principles of protection, drop wire installations.

Volume II is an 80-page booklet of 20 installments. Covers installation and maintenance of Sub-Station Protectors, Station Wire Installation, Subscriber Installation, Fault Locating, Relay Circuit Analysis, Planned Maintenance Program, Electronic Testing of Aerial Cable and Drop Wire, Plant, Transmission Developments and Loading Coil Theory. Over 2,000 copies of Vol. II have been sold.

Over 17,000 copies of the two volumes have been sold domestically and abroad.

Either volume can be bought separately. We suggest, however, that you combine your requirements for both and take advantage of the following lower quantity prices.

Single Copy	$1.50 Each
2 to 25 Copies	1.35 Each
26 to 50 Copies	1.20 Each
More than 50 Copies	1.05 Each

To facilitate handling the large volume of requests for ABC booklets, TELEPHONY has arranged for all orders, remittances and inquiries to be sent directly to Mr. Lee, the Publisher. For your convenience use coupon below.

FRANK E. LEE, Publisher
1751—183rd STREET
HOMEWOOD, ILLINOIS

Please send the following:
____ Copies of ABC, Vol. I
____ Copies of ABC, Vol. II

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Planning Your Automatic Conversion

By S. R. SWANSON*

THE STEP from manual to automatic operation is a serious one and the financial aspects of this situation could well be the subject of a complete discussion by someone more qualified than myself. We can say in passing, however, that not all exchanges can be economically converted to automatic and each situation must be studied in the light of its own conditions.

In our business, we should have no apologies to make for the fact that we are in business, like everyone else, to make money. There is no economy in creating an investment that is too great, after considering all possible savings together with increased earnings following rate relief, to permit an adequate return on the investment. It is entirely possible that in an exchange that is a toll center and in which the toll board must be continued after conversion, traffic expenses might actually increase and there is no financial advantage in going to dial operation. Under automatic operation, we are required to maintain the plant at a higher level of perfection and more skilled technicians are required to maintain the central office equipment. These factors represent increased costs. The only savings to be derived would be through the elimination of operator expenses and we normally might expect some increase in the rate structure to cover the increase in plant investment.

In approaching the matter of automatic conversion, we must remember that the equipment manufacturers require all the way from one year to two years or more to deliver equipment. Consequently, our planning must be at least that far in advance of the proposed date of conversion. There are two stages in the successful completion of a conversion. First, the planning stage and, second, the execution. In my remarks here, I may frequently refer to the Commercial, Plant or Traffic Departments, fully realizing that in a small company one or two individuals must handle all of these functions.

The first step to consider in the planning stage would be a commercial survey. This would consist of locating all of the existing stations on maps of the urban and rural areas. Then all of the held orders for service would be similarly located as well as future prospects for service. Consideration must further be given to those people that have applied for an up-grade in service; that is from party line to private line service.

With all of this information on the map, it is possible to determine the line requirements in each area of the exchange at the date of cutover. Possible future growth must be determined by a study of the growth that has occurred in the past, tempered with judgment on the existing trend and possibilities in the community such as: the increase in bank deposits, employment situation, real estate development and other factors. We then must take the line and station data as anticipated on conversion day and make a forecast into the future for a period of preferably 20 years. This forecast would be on an annual basis for the first five years following conversion and for five-year periods following that.

This commercial survey and future forecast is most important as a basis for determining both the equipment requirements for the initial installation and to incorporate in the design capacity for the ultimate as well as the initial plant requirements.

*Mr. Swanson is general plant superintendent of the General Telephone Co. of Upstate New York, Inc., Johnstown, N. Y.

Next, I believe that it is important that a traffic survey be made to determine the calling rate on the existing facilities as well as the holding time on calls, as this information is important to determine the trunk and switch requirements of the new automatic switchboard.

Prior to World War II, 10 per cent trunking, and even sometimes as low as 8 per cent, which in effect, thinking in terms of a manual switchboard, would be the same as the number of switchboard cords per hundred lines, was quite a common trunking percentage. During and following World War II, the calling rate was vastly increased throughout the nation so that today most equipment engineering is done on the basis of 15 per cent trunking, or in some cases even more.

The third step in planning would be a plant survey based on the results of the commercial and traffic surveys in order to determine what moneys would have to be spent to condition the outside plant for dial operation and provide plant margins for growth. I am here thinking in terms of conversion from magneto to automatic plant. It is important in completing the economic study to see whether or not the automatic conversion can be proven in on the basis of earnings.

The commercial survey is used as a basis for determining the number of lines or cable pairs on each main feeder route away from the office to see whether or not the existing plant is adequate in size to meet the anticipated growth and, if it is not, cable reinforcement or replacement is necessary and additional wire may be required on some of the rural leads. This is particularly true in those communities that have been served under a magneto

DIAL CONVERSION SCHEDULE—CORINTH EXCHANGE

Sheet No.
Section C
Department Commercial

Item No.	Ref. No. Other Depts.	Description of Work	Date to be Compl.	Date Started	Status—% Completed	Date Compl.	Remarks
1	T2	Determine method of listing and handling police, fire alarm, and other emergency calls.	11/1/54				
2		Determine method of handling Western Union Calls.	11/1/54				
3		Review furniture requirements and order new equipment.	10/1/54				
4		Prepare instruction card for each station for operation during interim.	11/1/54				
5		Have paystation instruction cards designed and printed. Determine type of dial card.	11/1/54				
6	M14	Furnish District Maintenance Supervisor with instruction cards to be delivered to each station.	1/15/55				
7	E8	Secure from Plant Engineering two copies of new dial assignments, showing old and new numbers and subscribers' names. Check against contract cards advising Plant Engr. of discrepancies. Follow up for corrections.	1/15/55				
8		Issue "D" service orders covering change from manual to dial operation. Establish system of transmittal of #1 copy in advance to Revenue Accounting.	2/10/55				
9		Prepare news releases on completion of building and start of installation of central office equipment.	1/1/55				
10		Transfer business office from old to new quarters. Advise subscribers of change.	12/1/54				
11		Remove all signs from old central office.	12/1/54				
12	C28	Issue transfer reports and dispose of furniture and fixtures.	12/1/54				
13		Coordinate operations of alarm send, busy override, alarm check, coin box tone, etc., with New York Telephone Co.	2/1/55				
14		Advise Plant and Traffic Departments of closing date of directory.	1/1/55				
15		Prepare directory including instructions for use of dial equipment, method of handling emergency calls, service calls, paystation calls, reverting calls, etc.	2/1/55				
16		Close directory.	3/1/55				
17	T10	Check directory proof with Traffic records to assure correct listings and assignments.	3/15/55				
18	T14	Arrange for directory delivery.	4/10/55				
19		Revise and submit to PSC rates for service for Corinth and Luzerne subscribers.	1/15/55				
20		Arrange for installation of two dial telephones (demonstration) in business office.	3/1/55				
21		Prepare advertisements to appear in local paper announcing exact time of cutover and giving instructions for use of dial equipment.	4/1/55				
22		Prepare bill inserts announcing time of cutover and dial instructions.	4/1/55				
23		Arrange for demonstrations before civic clubs and schools.	3/15/55				
24		Advise Luzerne subscribers of change to extended area service and provide with operating instructions.	4/1/55				
25		Arrange cutover ceremonies.	4/1/55				
26		Cutover at _____.	4/15/55				

service and have over 10 customers on a line since, under automatic operation and to conform with standards set by the public service commission, these lines would all have to be unloaded to 10 or less at the time of conversion.

[**EDITOR'S NOTE:** *The forms on pages 29, 30, 31, 32 and 33 are discussed on pages 75, 76 and 77.*]

In those areas of the rural plant where the commercial survey indicates considerable prospect for growth, the rural lines might be unloaded to a fill of 7½ customers per line, on the average. Having determined the condition and adequacy of the outside plant, plans at that time should be formulated for correcting deficiencies to meet the new requirement. These plans should include drawings showing the work and written cost estimates detailing the material and labor requirements. From the commercial survey, with its forecast into the future, we can determine the size of the new automatic switchboard as to lines wired and equipped and from the traffic survey we can also determine the percent trunking required.

There are other considerations that we must think about in connection with the new switchboard such as the features desired—what type of ringing would we like to employ such as straight-line divided, harmonic, synchromonic or decimonic. How would we like to handle reverting calls? What type of intercept feature would we like to incorporate; that is, would we only like to intercept changed numbers, or would we like 100 per cent intercept which would include all vacant numbers and unused levels in the equipment? Would this intercept be accomplished by projecting the calling customer directly to the control office operator over a trunk, or would we use a tape recorded message that the customer would hear in dialing an intercepted number?

The matter of alarms must be considered. Would we have an alarm checking terminal that the control operator would dial up to determine the condition of the equipment or would we use extended alarms into the control office which would tell when we had had a power failure, ringing machine failure, or what not?

Do we want to provide in our equipment a busy override feature so that the control operator can override a busy signal and determine the condition of the circuit?

Do we want to provide terminal-per-line or terminal-per-station equipment? The terminal-per-station is more expensive but permits movement of subscribers without number changes and the decision on its use would hinge on the volume of station movement experienced in the exchange.

As you are perhaps somewhat aware from articles appearing in the national trade magazines, the Bell System companies are going into nation-wide customer dialing. This is a plan whereby the customer is able to dial station-to-station toll calls anywhere in the United States or Canada in addition to local calls. Toll calls to points within a relatively large area will be dialed, just as local calls are, by dialing the initial two letters of the central office name plus the five numerals listed in the telephone directory. In other words,

DIAL CONVERSION SCHEDULE—CORINTH EXCHANGE

Sheet No.
Section T
Department Traffic

Item No.	Ref. No. Other Depts.	Description of Work	Date to be Compl.	Date Started	Status—% Completed	Date Compl.	Remarks
1		Advise Traffic employes of effect on their work caused by dial conversion.	1/1/55				
2	C1	Determine call number assignments for Fire Department, Police Department, and official company stations.	11/1/54				
3	E13	Prepare Toll Line Traffic Orders for circuit changes.	2/1/55				
4	E8	Secure from Plant Engr. two copies of new dial assignments, showing old and new numbers and subscribers' names.	1/15/55				
5		Check list with Traffic records and advise of any errors.	1/20/55				
6		Make temporary bulletin for use during replacement of station apparatus.	2/10/55				
7		Instruct operators in use of bulletin.	2/20/55				
8		Coordinate operation of alarm send, busy override, alarm check, coin box tone, etc., with New York Telephone Co.	2/1/55				
9		Coordinate toll operating procedure with Bell.	2/1/55				
10	C17	Check directory proof with Commercial Department.	3/15/55				
11		Check directory instructions.	3/15/55				
12		Notify by telephone all subscribers of the date and time of cutover and check directory delivery.	4/15/55				
13		Prepare tape recording for intercept service.	3/1/55				
14		Furnish Commercial a list of subscribers who have not received directories.	4/15/55				
15		Prepare change number bulletin for Glens Falls information.	4/12/55				
16		Cutover at _____.	4/15/55				

two—five numbers and, toll calls beyond this area would be made by dialing a three-digit area code followed by two letters of the central office name and the numerals listed in the telephone directory.

This plan employs equipment that automatically times and tickets the call being made. It is a decision that the small company owner must make as to whether or not he can justify participating in this plan, or if not fully participating, whether he wishes to arrange his new office to accept incoming calls on the nation-wide customer dialing basis. This, of course, means possible use of special toll trains, digit absorbing equipment, the use of 100 per cent intercept and other factors all of which cost money.

Even though you decide against participation in the subscriber toll dialing plan, your equipment should be arranged to accept incoming operator toll dialing by providing 120 I.P.M. flash and 60 I.P.M. busy signalling to the toll operator. The cost of this feature is negligible when built into the equipment at the factory.

With certain basic information available that we have discussed previously, the small company owner can call in a manufacturer of his choice and obtain

DIAL CONVERSION SCHEDULE—CORINTH EXCHANGE Sheet No.
Section M
Department District Maintenance

Item No.	Ref. No. Other Depts.	Description of Work	Date to be Compl.	Date Started	Status—% Completed	Date Compl.	Remarks
1		Order dial station apparatus					
		a) Paystations — P.O. #U-					
		b) Other — P.O. #U-	10/1/54				
2		Delivery of station apparatus.	1/15/55				
3		Order other material required for rewiring and station replacement.	9/15/54				
4		Delivery of other material.	10/15/54				
5		Provide electric iron for MDF.	3/1/55				
6		Provide fire extinguisher for central office.	2/1/55				
7	E7	Secure from Plant Engr. Rewiring Check Sheets.	10/1/54				
8		Check drop and inside wiring and replace where necessary.	2/1/55				
9		Check station protectors and grounds.	2/1/55				
10	E8	Secure from Plant Engr. copy of new dial assignments showing old and new numbers and subscribers' names.	1/15/55				
11		Check list with Plant records and advise of errors.	1/20/55				
12		Advise owner of leased quarters of date lease will be terminated.	11/1/54				
13	E9	Secure from Plant Engr. Cutover Sheets.	2/15/55				
14	C6	Install dial station apparatus and leave instruction card with subscriber.	4/10/55				
15	C6	Place instruction card and new directory at all public paystations.	4/10/55				
16		Make insulation breakdown tests.	3/1/55				
17		Prepare and keep corrected daily new line cards and cable records.	4/15/55				
18	E15	Prepare cross-connecting assignments for local lines.	4/10/55				
19	E15	Prepare cross-connecting assignments for toll trunks, free service trunks.	4/10/55				
20	P7	Run trunk, subscriber line, and miscellaneous jumpers on MDF and keep corrected.	4/12/55				
21	P7	Verify heat coils on MDF protectors.	4/12/55				
22	P7	Check station line numbers on new MDF. Make call-through tests.	4/12/55				
23	E14	Set up magneto network for cutover.					
24	P7	Make final MDF jumper check.	4/15/55				
25		Cutover at _____.	4/15/55				
26		Check paystations immediately after cutover.	4/15/55				
27		Remove magneto equipment after cutover. Check subscribers' dial for operation, test reverting call and ringers.	5/10/55				
28		Prepare permanent cable records.	4/12/55				
29		Arrange for disposition of furniture and office supplies at old office.	4/20/55				
30		Arrange to have necessary repairs performed on leased building.	5/1/55				

DIAL CONVERSION SCHEDULE—CORINTH EXCHANGE

Sheet No.
Section E
Department Gen. Plant Engr.

Item No.	Ref. No. Other Depts.	Description of Work	Date to be Compl.	Date Started	Status—% Completed	Date Compl.	Remarks
1		Prepare estimate for construction of building (E-51-54).	9/15/54				
2		Building ready for equipment.	12/1/54				
3		Prepare estimate for outside plant work and replacement of station apparatus (E-50-54).	9/15/54				
4		Determine that all material is on order for conversion.	10/1/54				
5		Secure bids for conduit work and award contract.	9/15/54				
6		Construct conduit facilities.	12/1/54				
7	M7	Release rewiring check sheets.	10/1/54				
8	C7 T4 CO9 M10	Prepare list of dial assignments showing old and new numbers and subscribers' names. Furnish copies to Commercial (2), Traffic (2), Dist. Maint. Supv., Gen. Equipment Supv., and Rev. Accounting.	1/15/55				
9	M13	Release cutover sheets.	2/1/55				
10		Make transmission check of toll circuits.	4/1/55				
11	P5	Make crosstalk tests on exchange cable.	3/15/55				
12		Coordinate cutover with Bell Company.	4/12/55				
13	T3 CO16	Secure toll line traffic orders from Traffic. Forward to Plant for completion.	2/1/55				
14	M23	Formulate cutover procedure.	3/15/55				
15	M18 M19	Aid in preparation of cross-connecting assignments, testing, etc.	4/12/55				
16		Cutover at _____.	4/15/55				

DIAL CONVERSION SCHEDULE—CORINTH EXCHANGE

Sheet No.
Section CO
Department Equipment Engr.

Item No.	Ref. No. Other Depts.	Description of Work	Date to be Compl.	Date Started	Status—% Completed	Date Compl.	Remarks
1		Prepare floor plan and detailed specifications for central office equipment.	9/15/54				
2		Order central office equipment (Purchase Order #U-_____).	9/1/54				
3		Prepare estimate for central office equipment (E-49-54).	9/15/54				
4		Prepare and distribute operating features of dial office equipment (Traffic—3, Commercial—2, 1 each to other member, 3 extra copies for FMV).	2/1/55				
5		Provide ringing equipment and keys for operation of dial station apparatus prior to conversion.	2/15/55				
6		Delivery of main distributing frame.	12/15/54				
7		Install main distributing frame.	1/1/55				
8		Install and test central office ground.	1/1/55				
9	E8	Prepare dial assignments in cooperation with Plant Engineering.	1/15/55				
10		Delivery of other equipment.	1/7/55				
11		Installation of central office equipment completed by manufacturer.	3/31/55				
12		Testing of central office equipment completed by manufacturer.	3/31/55				
13		Test all local dial equipment for operation.	4/10/55				
14		Test all toll and free service equipment for operation.	4/10/55				
15		Cutover at _____.	4/15/55				
16	E13	Complete toll line traffic orders.	4/15/55				
17		Remove old central office equipment.	5/1/55				

his assistance in working out these many details with the view to obtaining a quotation on the equipment and a delivery date. I believe all the manufacturers have questionnaire data sheets which they will furnish to a prospective buyer on request. The manufacturer must know the resistance of the longest loops, the type and makeup of trunks to the control office and many other things which I do not have the space to discuss here.

Another factor to consider in the plant survey would be the location and housing of the new automatic office. In many instances, the existing central office building is inadequate for this purpose and a new building must be erected. These buildings for the small office need not be very large. The manufacturers' representatives, I believe, have typical floor plans of various size offices. The cost of this building, as well as the cost of land acquisitions, must be considered in studying the prudence of the proposed investment.

It is most important that you keep your connecting company or toll center informed of your plans well in advance of any conversion date as it might well take the connecting company over a year to obtain certain equipment to match the proposed trunk equipment in your office. Your attention is also directed to the fact that when you discontinue your manual office, where you have been handling information service, repair service and the timing and ticketing of toll calls, and pass this work over the trunks to the toll center operators, you may reasonably expect to be charged by the connecting company for these additional services. These charges must naturally be negotiated with the connecting company when you are considering automatic conversion and are a consideration in proving in the new investment.

I believe, at this point, it might be well to briefly run through some of the standards that must be attained in the outside plant to make a successful conversion. In examining your pole lines, all poles which are broken off or so split, cracked or rotted at the ground line as to have insufficient strength to carry the attachment load at the time of cut-over should be replaced. All poles having two years of remaining life or more, after the cut-over date, on the basis of remaining sound wood at the ground line, should be retained in service. Poles judged to be unsafe to climb should, of course, be replaced.

All cross-arms which are broken or so rotted or split that they cannot hold the pins should be replaced. I would replace all iron wire which has rusted to the point where the diameter has been reduced approximately 20 per cent, or has become so brittle it cannot be spliced with compression type sleeves. All hand joints should be cut out of existing wire leads. Twisted sleeve joints may be retained unless tests made in connection with line balancing show them to have excessive resistance.

Compression type sleeves should be used to replace defective wire splices removed. Extra long compression sleeves are available for repair work. Where the number of defective sleeves or hand joints is excessive, replacement of the wire may prove more economical.

In examining cable plant, I would recommend that we first remove all taped splices in the aerial cables and after cleaning the terminal face plates, we should test a minimum of 25 per cent of the cable pairs in each sheath with a cable insulation Megger. These pairs should be tested side to side, pair to pair, and the pairs bunched to the sheath. Corrective action must be taken on any readings that are less than 15 megohms. It is frequently more economical to replace a short length of cable than to remove a large number of taped splices. Also, older cables, where the sheath is badly ring-cut or crystallized, should be replaced. Ring cuts can often be repaired economically by using the electrode soldering tool.

For the over-all plant, an insulation test should be made on each exchange line with a 100,000-ohm voltmeter, using 90 to 100 volts of battery. This test should be made in wet weather and any readings of over 15 volts, short, ground, crosses or foreign battery must be cleared prior to the start of the instrument changeout work on the conversion. The use of this test will reveal outside plant conditions that need correction and will eliminate the replacement of drops and covered wire by visual inspection. In order to meet the insulation requirements, it is most important that the entire plant be free of tree grounds and that all broken or missing insulators on the wire be replaced.

By following these few simple rules, you will have a good working plant at the cut-over date, and excessive time and material will not be expended.

In making the plant survey and engineering the work requirements that we have briefly described, it would be

(Please turn to page 72)

DIAL CONVERSION SCHEDULE—CORINTH EXCHANGE

Sheet No.
Section P
Department District Construction

Item No.	Ref. No. Other Depts.	Description of Work	Date to be Compl.	Date Started	Status—% Completed	Date Compl.	Remarks
1		Complete line construction work on outside plant Estimate E-50-54.	2/1/55				
2		Terminate entrance cable on MDF.	2/1/55				
3		Complete trimming of all lines.	3/1/55				
4		Complete pre-conversion splicing on Estimate E-50-54.	3/15/55				
5	E11	Megger all vacant cable pairs and aid Transmission Engineer in cross-talk tests.	3/15/55				
6		Patrol all lines just prior to cut-over to check tree clearances, broken insulators, etc.	4/8/55				
7	M20 to M24	Aid District Maintenance Supervisor in jumper and testing work.	4/12/55				
8		Cutover at _____.	4/15/55				
9		Cut out half-taps and close all splices.	5/1/55				
10		Complete removals on Estimate E-50-54.	6/1/55				

New Devices in Communications

By RAY BLAIN*

PART I

1. *GENERAL.* The Independent telephone industry is constantly on the alert in its search for new ideas, involving better methods, tools, and materials. New things that prove economical and contribute in any manner to the provision of better communication are promptly adopted. It is with this thought in mind that the (USITA) Plant Committee offers the following items for your consideration.

2. Tools

2.01. *Portable Power Hack Saw.* There are many jobs in the telephone exchange, such as the erection of iron work in new automatic exchanges, where a hack saw must be used frequently. The old-fashioned hand variety not only represents a lot of labor and time, but also few workmen can make a square and true cut. Power hack saws have been used in the past to some extent, but for the most part they have been large, cumbersome and difficult to move about. This objection has recently been overcome by a new power hack saw that is so light that it is carried with one hand. This new saw operates with draw cut and lift return on a new patented principle which eliminates the necessity for the use of weight. Sawing pressure is easily adjusted for any job from 3 inch x 3 inch solid tough steel to thin wall brass tubing. This makes it possible for the tool to operate in any position. It will cut downward, vertically, and even upside down, if necessary. The work vise may be clamped to a pipe or stanchion in any position and a clean true cut will result.

This saw is precisely built, very rugged and weighs only 48 pounds. Alloyed aluminum or magnesium are used wherever possible. It is powered by a one-quarter horsepower electric motor. The drive is worm and bronze gear, totally enclosed and running in oil. The drop forged steel crank is equipped with a silent roller. It has a speed of 115 strokes per minute with no load.

2.02. *Portable Heat Gun.* This new heat gun provides a safe, handy means of providing heat required for numerous purposes around the telephone exchange. It can be used to dry out wet cable quickly. It can also be used to dry paint or drawings. It will blister paint for easy removal by scraping.

This heat gun is rated 3400 B.T.U. The air temperature at the nozzle is 300 degrees F. The air volume 50 C.F.M.—air velocity, 2,000 F.P.M. It operates from 110 to 130 volts ac and is rated at 1,000 watts. It weighs only 4½ pounds.

This tool's many features include an adjustable air intake for controlling the air blast temperature; a double jacketed heater housing; turbo type fan blade is efficient and quiet in operation.

2.03. *Circuit Identifier Test Set.* Operating telephone companies are always interested in the reduction of labor costs and the elimination of the cable splicer's helper is certainly a move in the right direction. We do not intend to infer that splicer's helpers are lazy, but we all know that a good part of their time is lost in waiting until the splicer has a need for their services. The Murphy cable tester is certainly a step nearer the one-man cable crew as it permits a splicer to tag all pairs in a cable without the need of a helper.

This tester includes a special terminal board with a bridged resistor which is connected to the distant end of the cable in which pairs are to be identified and tagged. Then, the milliammeter is adjusted to read zero and to compensate for the resistance of the cable pair. When the circuit is closed over one pair, it reads one, and so on through the terminal board.

The terminal board is connected so that when the tip side of the pair is identified the meter readings indicate "tens" and the ringside "units." In this manner, a 100-pair cable may be tagged by one man.

This instrument is actually three test sets in one. A four-position rotary switch changes the set from the basic cable pair identifier to a buzzer type continuity tester or to an ohmmeter.

2.04. *Portable Coin Sorters and Counters.* Now that the use of public pay telephones is on the increase in the Independent industry there is an indicated need for reasonably priced coin sorting and counting machines.

Portable coin sorting machines now available combine compactness, light weight and simplicity of operation. To use, simply place mixed coins in the hopper and turn on the switch. Anyone can sort 1,000 coins a minute into individual trays—ready for counting and wrapping.

The machine operates on 110-volt current, either ac or dc. It is 22 inches wide, 9 inches deep and 10 inches high. It weighs 30 pounds.

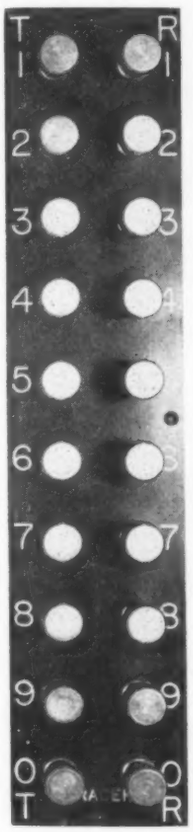
Coin counting machines can be obtained that are operated either manually or motor driven. These machines will count pennies, nickels, dimes and quarters. Only one simple adjustment is required to change from counting one denomination to another. The

*Mr. Blain is technical editor of TELEPHONY and a member of the Plant Committee of the United States Independent Telephone Association. He prepared this address for Plant Conference at the recent USITA Convention.

THE MURPHY (ONE MAN) CABLE TESTER

NEW...and DIFFERENT!! IMPROVED AGAIN...and at NEW LOWER PRICES!

THIS is the ONE-MAN Cable Tester that enables one man alone—WITHOUT a helper, to identify Cable Pairs all the way thru any size, non-working cable—JUST as FAST as he can touch a test pick to, first the TIP side, and then the RING side, and read the pair number right of the face of a special METER!



NO HELPER AT THE OTHER END! NO MISUNDERSTANDING! NO BACKTALK! NO WAITING!

FOR EXAMPLE: Touch the TIP side—say the meter reads "3". Touch the RING side—the meter reads "7"—THE PAIR NUMBER IS "37" . . .

IT'S JUST THAT SIMPLE—and if it was any simpler, we wouldn't believe it ourselves.

SOMEONE FROM THE FIELD asked us to add a buzzer to buzz out pairs in a terminal tail—so now we've done that. The buzzer can also be used for checking cross connections in an FX box or on the frame as well as for cutting in a piece of cable.

SOMEONE ELSE asked us if we couldn't make it easier to locate a short, ground, or a cross that was interfering with testing. NOW we've added a special OHMMETER scale on the meter, for that purpose—with a range especially adapted to this use.

THEN someone asked us if we couldn't make it AIR CONDITION the splicers tent—we haven't figured that one out yet—but if it can be done—we'll soon have it!

Seriously, the Telephone Industry's wide acceptance and enthusiastic approval of this UNIQUE tester has been gratifying—and has enabled us to lower prices as our production line reaches higher efficiency. These testers are now in use in every state in the Union. Orders are still coming in every mail. Let us figure YOUR prospective needs in on our future production schedule.

NOW . . . FOR LESS THAN A HUNDRED DOLLARS, YOU CAN GET A MURPHY CABLE TESTER, MODEL C

This tester will PAY FOR ITSELF with every four days use.

It will REPLACE THE HELPER on new cable work.

It, along with other devices needed in One-Man cable crews, will enable a splicer alone to do twice the work that a splicer and helper have been doing in the same time.

It will function as any one of THREE different Test Sets at the turn of a switch—No need to change the test leads—just turn the switch to the KIND OF TEST SET NEEDED!

CABLE PAIR IDENTIFIER	(one)
BUZZER CONTINUITY TESTER	(two)
OHMMETER	(three) COUNT 'EM yourself!

It will amaze you with its simplicity and ease of use—we can show a Cable Splicer, in FIVE MINUTES, all he needs to know about how to use it!

The Prices (F.O.B. Houston)

In lots of 1-9, $98.70; 10-29, $97.00; 30-99, $94.00; 100 and over $92.00 net each

Write for More Particulars or Order from This Ad—Direct fom the

MURPHY ENGINEERING LABORATORY

4419 TULSA, HOUSTON 24, TEXAS **PHONE TW-4000**

WRITE TODAY RIGHT NOW!

counted coins may be either packaged or bagged.

The manual model weighs 21 pounds and the motor driven, 31 pounds. Carrying cases may be obtained if desired.

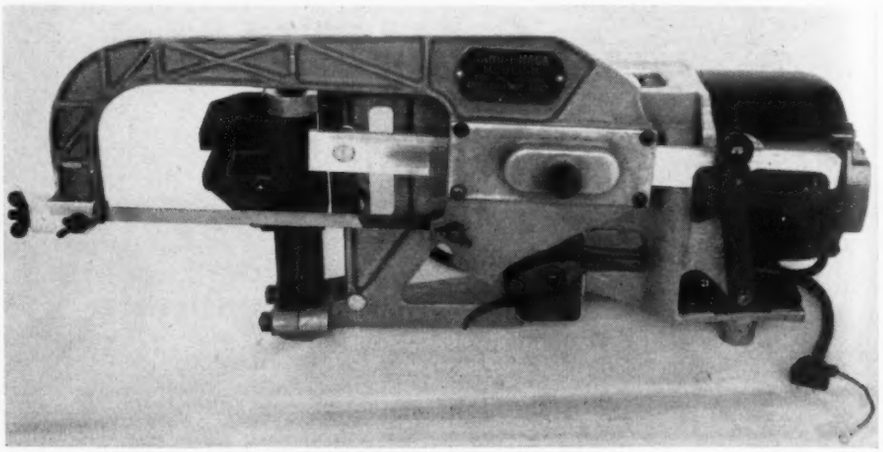
2.05. *Aluminum ladders for telephone work.* Ladders are by no means new to the telephone field, but they continue to be most necessary items. To the average person, a ladder is merely a wooden gadget designed with steps for use in climbing to places normally out of reach, but to the lineman and installer, it is one of his most valuable tools.

Most portable ladders are constructed of wood. Sitka Spruce, Noble Fir, Western Hemlock, Douglas Fir, Longleaf Pine and Norway Pine are six different kinds of wood that are used as material for the side rails. The most important qualifications in selecting material for the side rails are the weight of lumber per cubic foot, strength, stiffness, hardness, and resistance to shock.

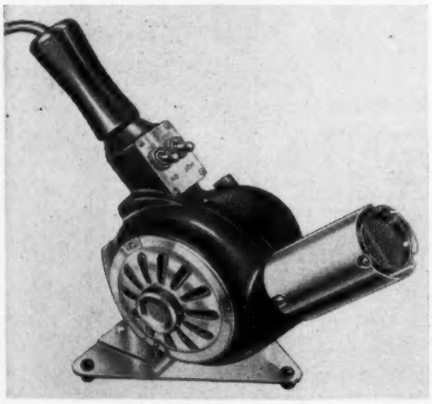
In the fabrication of rungs for these wooden ladders, the choice of wood is determined by the same characteristics listed above. Most desirable is Hickory, others are White Ash, Pecan, White Oak, and Maple.

In the common ladder industry, which includes the larger part of the users and one where low price is an important factor, wood is generally used. In the safety ladder industry which confines itself almost entirely to the industrial and utility fields, quality and safety are of the utmost importance, and price ceases to be a determining factor. It is in this field that metallic ladders have become widely used.

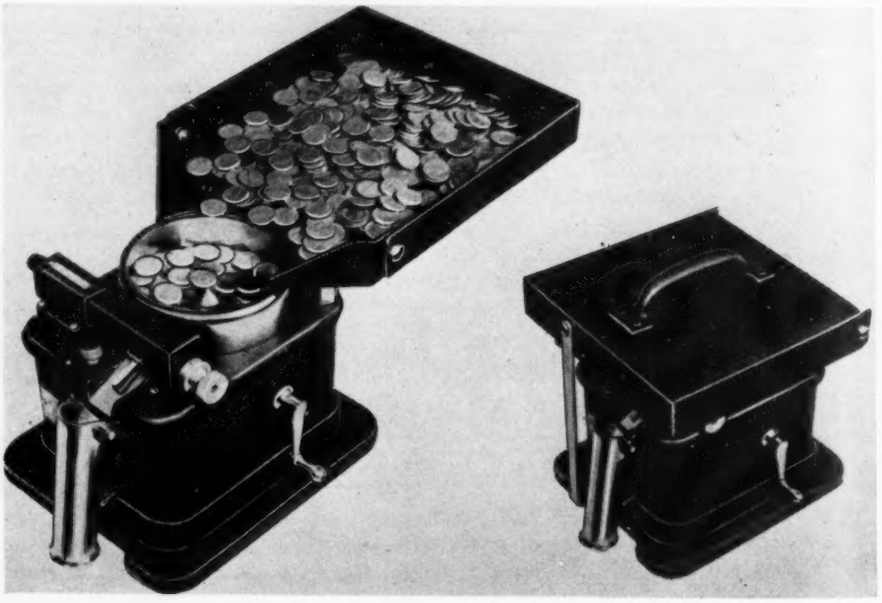
Aluminum ladders were first used for fire fighting and while the start was slow, the increase was steady so that by today most fire ladders purchased are made of this material. Also in industry, there has followed a simi-



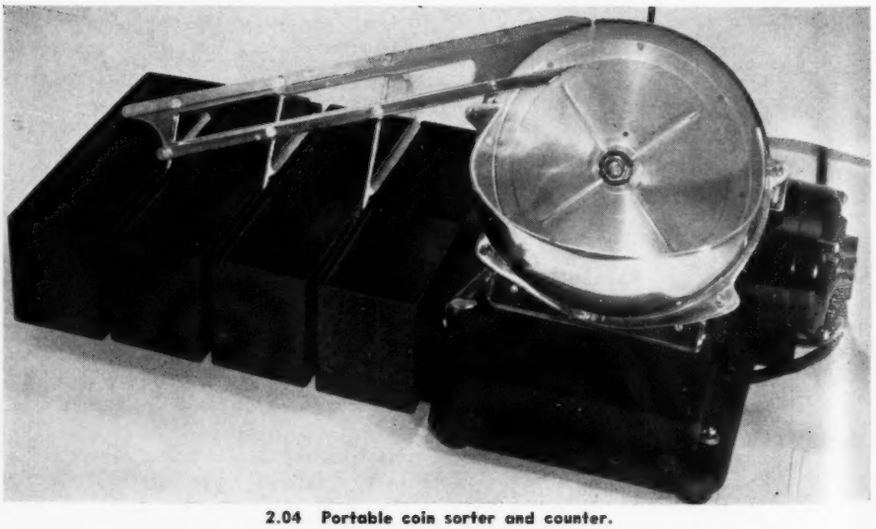
2.01 Portable power hack saw.



2.02 Portable heat gun.

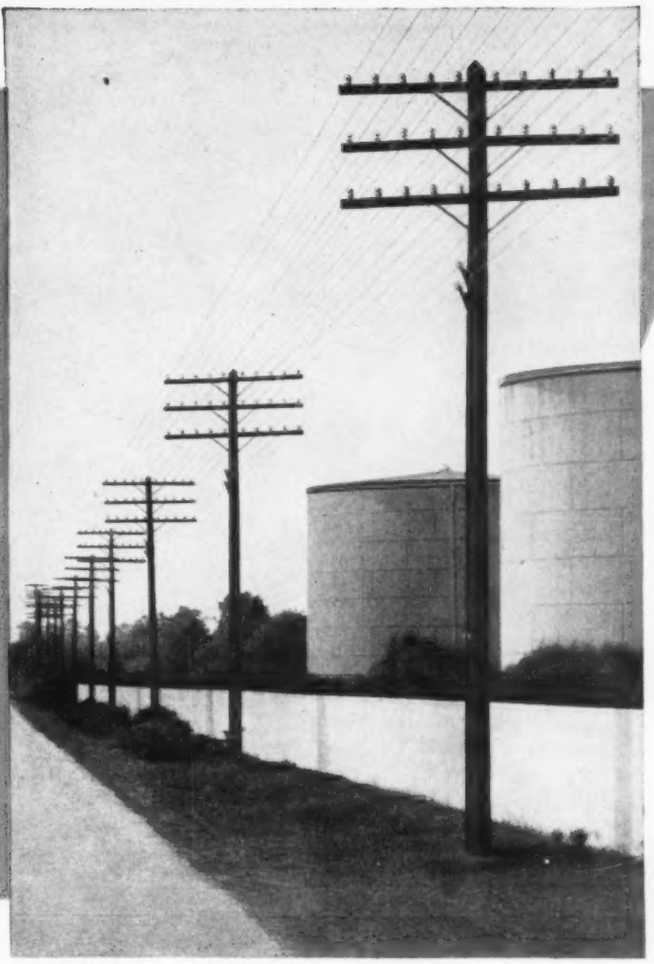


2.03 Circuit Identifier test set.



2.04 Portable coin sorter and counter.

IT'S *NOT* JUST *CREOSOTE* THAT MAKES AMCRECO POLES *LAST LONGER*



It's creosote oil plus Amcreco pressure treatment that gives longer life and greater dependability to Amcreco poles. The result of almost fifty years of continuous research and development, Amcreco pressure treatment forces protective creosote into the cells of the wood—armors the pole against insects and fungi. For you this means poles that last longer with greater strength throughout the life of the pole—longer line life with lower maintenance costs. Any of our conveniently located sales offices will be pleased to go over your next requirements with you.

Amcreco
Lowry Process
Creosoted Products

AMERICAN CREOSOTING COMPANY
INCORPORATED

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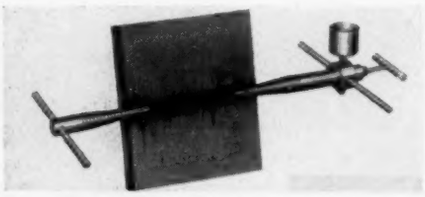
lar pattern of changing from wood to aluminum.

Users of aluminum ladders are well aware of the greater cost. They are aware, too, of the electrical hazards involved, for metal ladders are electrical conductors. Generally speaking, comparing the accident rate of wood and metal ladders, and considering the number of each type of ladder in use, volume for volume, the percentage of accidents with metal ladders is less, even allowing for electrical hazards. Any work around electricity is hazardous, regardless of equipment used, but with proper precaution, the electrical hazards of metal ladders can be minimized.

The facts for superior rating of the aluminum ladder remain. These ladders are considerably lighter in weight than wood. An aluminum channel rail is approximately two to three times stronger than a similar section of wood. Obvious to users, too, is a longer life with safer performance. This longer life results from the fact that aluminum does not deteriorate with age or moisture conditions. Aluminum ladders, because of greater resiliency, will



2.06 Bolt hole treaters.

give sufficient warning before breaking, whereas with wooden ladders the bending and breaking point is often almost simultaneous.

Unless a ladder is properly handled, construction, design and care may mean little in today's safety world. The design may be created by a skilled engineer, and the ladder's care may be administered by the most thoughtful maintenance supervisors, but most important to ladder safety is correct handling.

It is advisable to purchase ladders equipped with safety shoes to prevent slipping. These shoes should always be an integral part of the ladder so that they cannot be removed. One type of straight and extension ladder comes equipped with this accessory designed in the form of a rubber suction sole for indoor use and a sharp, jagged spike of hardened steel for outdoors. All-aluminum step ladders are also available for general telephone use. These ladders are also considered safe when used properly.

2.06. *Bolt Hole Treaters.* When a bolt hole is bored through a treated pole the untreated center may be ex-

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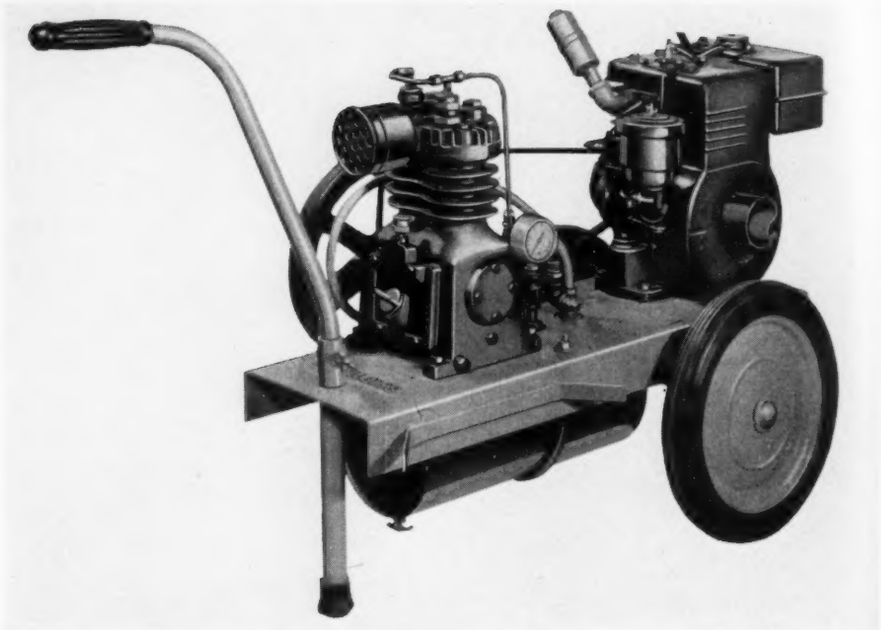
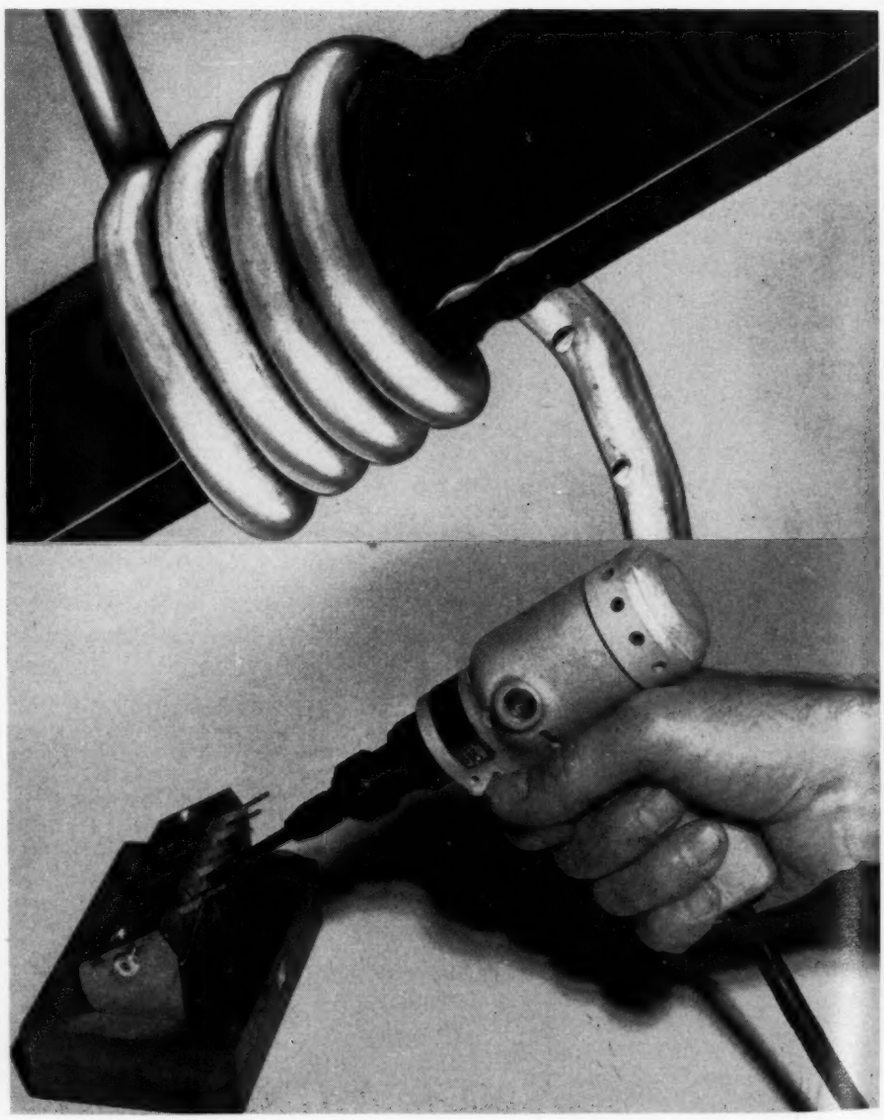


2.07 Portable air compressor.



2.08 Solderless conections.

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GENERAL SYSTEM

Automatic Power Plant Now Nears Perfection

By L. N. MARTIN

IN THIS series on the power plant we have traced the development of storage battery maintenance from the earliest two-battery office up to the full float method. We should not say that perfection has been reached for that would stop further progress, but the full float, continuous float, or automatic float (as it is variously called) seems very near to perfection.

In the automatic float method the generators and/or rectifiers are automatically regulated so that their output is always equal to the load on the board, therefore the battery neither charges nor discharges. There are four very great advantages obtained by this method:

1) The battery is not "worked," therefore its life is prolonged. This means a large saving in the cost of battery replacements and repairs. Furthermore, the battery need be only large enough to carry the plant through any foreseeable power interruption as it no longer is required to carry the plant overnight or between charging periods. This reduces the first cost of the battery. If an emergency engine-generator set is provided, no interruption should exceed one hour.

(2) The maintenance man-hours are reduced to a minimum as the plant is entirely automatic. It would be wrong, however, to say that maintenance is entirely eliminated as the automatic equipment itself can get out of order if certain inspections and tests are not made at regular intervals.

(3) The voltage of the fully automatic plant is at a constant level. This reduces relay and switch trouble to a minimum and reduces subscriber reports.

(4) There is great economy in the power used. Whenever power is changed from one form to another a certain per cent of loss occurs. When the power is changed from ac to dc by the motor-generator or rectifier there is a loss. When it is changed from dc current to chemical energy, as the battery is charged, there is a loss. When it is changed from chemical energy back to a flowing current of electricity as the battery discharges, there is another loss. *The full float method eliminates these last two losses.*

For the above four reasons we believe that any telephone company that does not now have a fully automatic power plant should at once ascertain the cost of such a plant and compare it with the probable cost of maintaining the old plant over a period of years including the cost of replacing and repairing the battery and the higher man-hour cost of the manual method. The reduced trouble due to level voltage should also be considered.

A natural question is: "If we convert to automatic float can we just add a regulator to our present rectifier or motor-generator, or can we re-use any of our present power plant?" We are afraid that in most cases the answer will be "No," but there may be exceptions and that question is worth investigating.

PART 41. The preceding article in this series appeared in the September 25 issue, page 54.

There are some types of non-regulated rectifiers that could readily be converted to a regulated type if the manufacturer could see his way clear to make "kits" for this purpose. Any good power engineer could also do the job but the cost of engineering an individual job and then doing the work by hand would probably be prohibitive.

A regulator may easily be added to any motor-generator set and this has often been done. (It is a separate unit mounted on the power board.) However, if the generator is large enough to carry the peak load it will be uneconomical to run it all night. An automatic power plant runs 24 hours per day. One solution would be to add a small regulated rectifier to carry the late evening and night load. However, the average small or medium sized office today does not have a motor-generator set but uses a rectifier.

There is one case where a non-regulated rectifier can be re-used. Suppose that a company now has a 20-ampere non-regulated rectifier that will just barely carry the present load so that a second rectifier must be added in the near future whether or not the power plant is made automatic. This company can install a second 20-ampere rectifier of the regulated type. The new rectifier will carry the load up to 20 amperes. A simple relay can be added which will start the old non-regulated rectifier as soon as the load goes above 20 amperes and the regulated rectifier will then drop back to zero. As the load increases above 20 amperes, the new regulated rectifier automatically takes it up.

Therefore, we suggest that before giving up the idea of installing an automatic plant because of the cost of a completely new plant, that you consult the company that made your present equipment or consult an engineer as to the possibility of re-using some of your present equipment. Of course, if you are installing a new office, the new power plant will be fully automatic. In fact, it would be hard to get any responsible supplier to sell you anything else.

How is regulation accomplished? We will not have space in this article to fully describe the many types of automatic power plants that are now available, but we hope to do so in a future article. At this time we will discuss only a few of the principles involved.

All regulators that we have seen are actuated by the voltage of the battery. In our article on the voltage of the storage battery (TELEPHONY, Aug. 28, p. 21) we stated that a floating battery has a voltage of 2.15 per cell, a charging battery has a voltage higher than 2.15, and the voltage of a discharging battery is less than 2.15.

The converse of this statement is also true. If we carefully read the voltage of a battery and find that it is 2.15 per cell we may be sure that the battery is either floating or is on open circuit. If the voltage is higher than 2.15 the battery is charging. If it is lower than 2.15 the battery is discharging. The first stage of the control equipment, whether it is a self regulating rectifier or a separate control unit, is connected to the negative pole of the

(Please turn to page 48)

Switchboard and Equipment . . .

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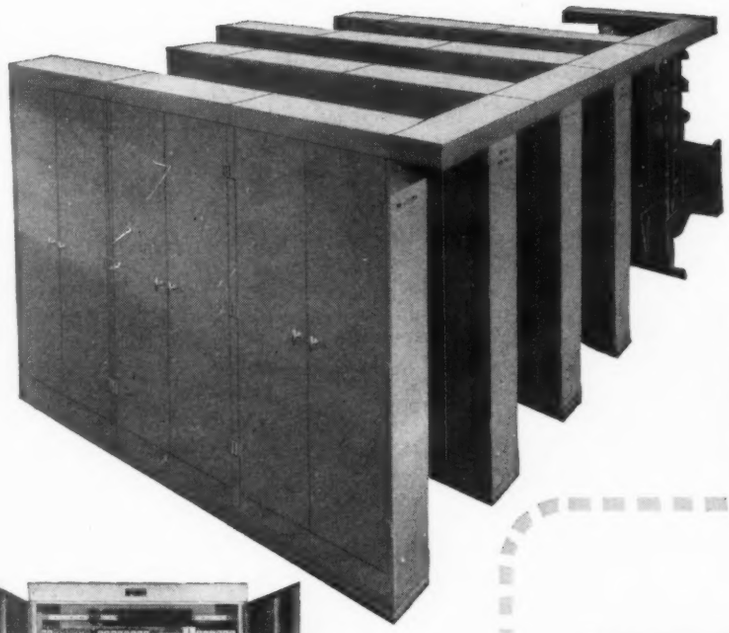

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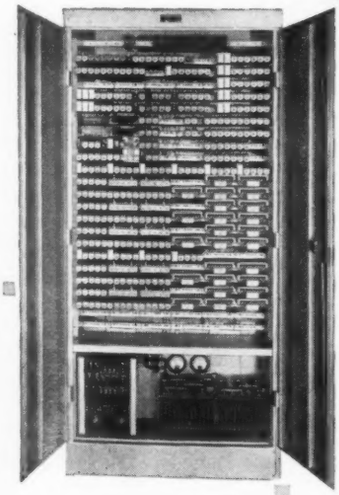

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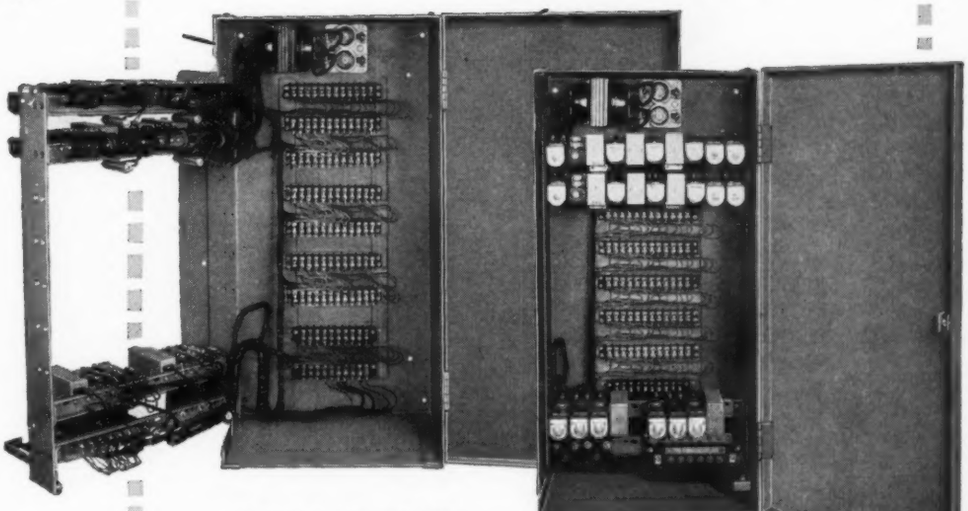

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battery. When the voltage gets above 2.15 per cell the control equipment functions to reduce the output of the charging equipment. When the voltage drops below 2.15 the control equipment functions to increase the output of the charging equipment.

Automatic floating should also include a provision for automatic charging. By operating a key the regulator is changed so that it will hold the battery at a voltage higher than floating such as 2.40 or 2.45 volts per cell. The battery is thus charged by a constant voltage method.

We now come to a few facts about automatic floating that may not be so well understood. *No regulating device will keep the voltage of a rectifier or generator "on the dot."* This is true of either automatic or manual regulation.

Watch the experienced motorist steer his car on a straight smooth pavement. The car may seem to be going in a straight line but watch the hand on the steering wheel. He turns the wheel slowly first to the right and then to the left. In other words he first corrects for a left hand drift and then for a right hand drift. Now the car must actually start to drift off of the course so that the driver can sense it. (An experienced driver does this quite unconsciously.) Then it requires an appreciable time for the driver's nervous system to react and there is some lag in the stearing gear of the car, therefore, the car is still further off the course before the drift is corrected.

Ships are sometimes kept on course automatically by an attachment to the compass. The ship must first drift off course enough to move the compass card far enough to make an electrical contact. This contact starts a motor or a steam engine which moves the rudder. All of this causes a time lag before the course is corrected.

Now, returning to the storage battery, the voltage must actually drop or rise an appreciable amount before the regulator can act to correct it. Also, there is a time lag in all regulators. In some regulators the time lag is so brief that it can hardly be measured, but in other devices, and especially when a rotary machine is to be regulated, the lag amounts to many seconds. This means that the voltage is not constant but varies up and down by an amount that depends on the reaction time of the regulator.

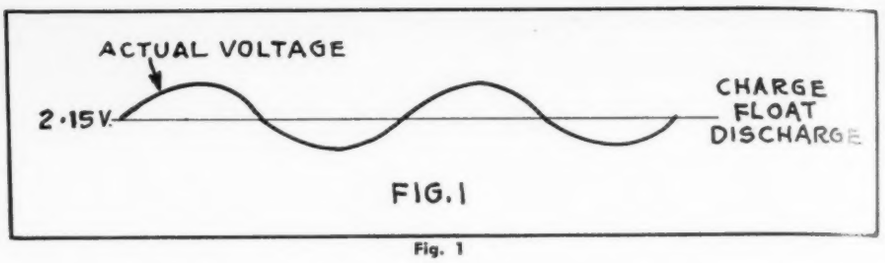

Fig. 1

Fig. 1 shows the voltage of a regulated battery. The straight line represents the true floating voltage and the curved line indicates the actual voltage. When the curve is above the straight line the battery is charging at a slow rate. When the curve is below the line the battery is discharging at a slow rate.

There is another condition that may cause a fluctuation in voltage. In some types of rectifiers a fluctuation in the ac line voltage will be reflected in the dc output. In most places, the power company is permitted a ±5 per cent variation in lone voltage, but it is often more than that as anyone who has ever placed a recording voltmeter on the line knows. The control equipment must also correct for this variation but cannot entirely eliminate it.

It may seem that these charges and discharges would compensate for each other so that the net result would be a true float. However the efficiency of the battery is far from 100 per cent, so we must always put more current into the battery than we take out of it. Therefore, the net result is very likely to be a slow discharge.

Now it has been found that there are two things that are very injurious to a battery which is maintained by the automatic float plan. One is a slow discharge that is not immediately corrected by a charge and the other is for the battery to stand in a partially discharged condition for a long time. Both of these errors will cause a trouble known as "sulphating." This trouble is hard to clear and sometimes it cannot be cleared and the battery may be ruined.

If the alternate charge and discharge which we have described is a net slow discharge and it is not corrected by frequent charging the battery will be injured. Also, if the battery becomes partly discharged because of a power failure, or because of a load which exceeds the capacity of the charging equipment, *it will never recover under this floating condition*, and if the discharged condition is not discovered and corrected by a special charge within a reasonable time, we have the case of a battery standing in a partially discharged condition for a long time and this also may cause sulphating.

It seems strange that even the larger companies did not realize this situation for a long time. We have just learned that at least one large company has at last taken action to correct this but only after they had lost several batteries.

The remedy is very simple. Instead of floating at 2.15 volts per cell they ordered all their regulators readjusted to a somewhat higher voltage. (About 2.17 per cell.)

The result is shown in *Fig. 2*. We still have the curving voltage line but it is now always *above* the true floating line. *The battery never discharges* unless there is a power interruption. Instead, it at all times receives a small "trickle" charge. Another way to express this is to say that, in addition to the float, the battery receives a continuous trickle charge. By this method (which we will call the "High Float Method") even if the battery receives a serious discharge because of an unnoticed power failure, it will ultimately recover of its own accord. This does not mean, however, that a battery should be neglected. If the power failure or other interruption is known or if the discharged condition is discovered by the specific gravity readings (which should be made at least weekly) this condition should at once be corrected by a charge at the normal rate.

The small trickle charge does no harm to the battery but does represent some waste in power. However, this will probably not be as wasteful as the weekly charging that is otherwise necessary to safeguard against damage to the battery.

Even with automatic full float the battery will discharge during a power

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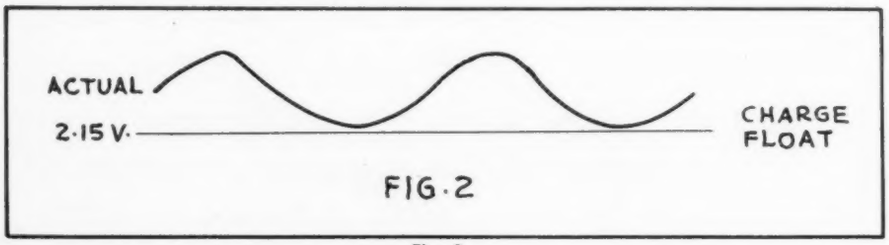

Fig. 2

Spontaneous, enthusiastic response greeted Automatic's new Type 80 Monophone at its first public showing. Here, at last, was the instrument telephone men had been hoping for.

It's Type 80 Monophone —by *Popular Acclaim!*

It was a heart-warming experience, the way telephone men received our new Type 80 Monophone!

They came, looked at Type 80, tried it—and then told us how much they liked it. *Here,* they said, was the telephone they'd been hoping for—the telephone with the practical features they'd always wanted.

Each man found something about Type 80 that particularly delighted him. And of course, that's not surprising—for we included in its design the features telephone men had *said* they wanted! Some of these features pay off directly in terms of time-savings on installation and maintenance. Others pay off indirectly —*but just as surely*—in terms of pleased subscribers who use the telephone more and more.

Either way, Type 80's add up to money in your pocket. So order today. Use the handy ordering guide in Circular 1841, inserted in Oct. 9th *Telephony.* Or, write *Automatic Electric Sales Corporation, 1033 W. Van Buren St., Chicago 7,* for a copy today!

AUTOMATIC ELECTRIC®

Good Customer Relations Start Here

By John A. Bracken

BASICALLY, every telephone company and employe must be vitally interested in furnishing the best possible service to their customers. Furthermore, if the company is to be operated successfully, good customer relations are not only desirable but mandatory. It is for this reason that progressive telephone companies go to considerable expense to promote good customer relations.

However, management cannot do it all alone; teamwork on the part of all employes is required. This is especially true of those employes having daily contact with customers.

Installers and repairmen are in this category and, through their own actions are in a position to greatly influence—favorably or adversely—customers' attitudes about the telephone company. They should not miss an opportunity to make friends for themselves and their company when they are at work on subscribers' premises. The following suggestions as to their conduct on or about these premises may be of help to installers and repairmen:

(1) Plan your work so that each task will be performed with a minimum amount of confusion and inconvenience to the customer.

(2) Carefully observe your company's rules and regulations. Perform standard quality work. It is part of good production, and it decreases the possibility of service interruptions.

(3) Keep in mind the safety of yourself and others. Be alert for hazards—recognize them and prevent accidents.

(4) Be considerate in selecting parking places. Park your car so as not to obstruct alleys, driveways, sidewalks, or other space which is obviously needed by the customer.

(5) Beware of dogs. Avoid surprising them when approaching.

(6) Ring the door bell gently and wait a reasonable time before ringing again. Be careful not to enter a residence, apartment or office (or do any work therein) in the absence of the customer or a responsible person.

(7) Before entering premises during inclement weather, remove rubbers or overshoes and wet outer garments. Ask the customer where to put them.

(8) Do not wear climbers when working on the premises.

(9) Take care not to come into the presence of a customer with an odor of alcoholic beverages about you. If a customer offers you a drink containing alcohol, politely refuse to accept it, explaining that it against the policy of your company to drink intoxicating beverages during working hours.

(10) Do not indulge in any objectionable manifestations, such as, loud talking, use of improper language, singing, whistling, etc.

(11) Refrain from smoking unless permission has been granted, or the customer suggests it.

(12) When moving about the premises do not open closed doors or enter rooms marked "Private" and "No Admittance," without the customer's consent.

(13) Do not divulge confidential information seen or overheard. Letters and papers laying around on the customer's desk are private and should not be examined or read.

(14) Do not tamper with customer's tools, machinery, electrical appliances, radio or television equipment.

(15) Do your work quietly and without disturbing the customer more than necessary. Work that might inconvenience the customer should be avoided insofar as possible, however, any work requiring considerable noise, such as drilling brick walls, cement, etc., should be coordinated with the customer.

(16) Perform all work so as not to damage any of the customer's property. Should any property be damaged, call the customer's attention to it at once, apologize and assure the customer that the damage will be promptly taken care of.

(17) Take care not to use desks, tables, chairs, or other furniture, for a work bench.

(18) Obtain permission before trimming trees or doing any similar work to which the customer may object.

(19) Be very careful working around flower beds and gardens, especially when using ladders.

(20) Ask directions when it is necessary to go to various parts of the premises.

(21) When an occasion arises to do some work on a neighbor's property, request permission of the neighbor. A courteous explanation of who you are and what you intend to do, in most cases, secures the desired permission.

(22) All questions asked by a customer should be answered, provided

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the right answers are known. If not known, assume the responsibility of obtaining the desired information personally (if possible) rather than referring the customer to other departments.

(23) Do not make promises to a customer unless you are authorized and assured they will be fulfilled.

(24) Be patient with inquisitive children. Keep tools out of their reach.

(25) Be prepared to install the telephone equipment by carrying the necessary tools and materials into the premises to complete the average job. Avoid repeated trips to the trucks for additional materials.

(26) Keep tools and materials in an orderly arrangement where they will not present a hazard or an unsatisfactory appearance.

(27) Install the telephone equipment to comply with the customer's request if possible. Should the location be undesirable from the standpoint of not conforming to station installation specifications, or other reasons, courteously explain the objectionable features to the customer. (Caution: When about to install a telephone, take care to avoid exposure to a contagious disease. Where a contagious disease is known to exist, the telephone can be installed temporarily through a window so that you do not come in contact with the disease.)

(28) Help customers who are undecided about where to install the telephone by tactfully offering the benefit of your experience.

(29) Obtain customer's permission before drilling holes or running wire where it may be considered objectionable.

(30) When an installation job is completed, clean up any "mess" made. Do not leave empty cartons or other packing material on the premises, without the customer's consent.

(31) Be sure that the customer understands how to use the telephone equipment and directory, especially the information pages. Inform the customer in regard to repair and commercial service.

(32) Avoid leaving a job uncompleted to perform work elsewhere. If called away explain fully to the customer.

(33) Thoroughly check the completed job. Convey to the customer assurance that the telephone equipment is in satisfactory operating condition.

(34) Show the customer how to avoid doing things that will injure or make the telephone inoperative. Explain effect of leaving handset off the cradle.

(35) If repairman clears a case of trouble at some point away from the customer's premises, return (if possible) and OK restoration of service in customer's presence. If asked about the trouble found, explain it in simple terms.

(36) When using a telephone line at a cable terminal or elsewhere, and the customer desires the line, announce yourself, apologize and release the line.

(37) If dispatched to a customer's premises to correct a condition claimed not to have been attended to properly by another repairman, do not criticize the work of your colleague, but simply express regret and make corrections to the customer's satisfaction.

(38) Refrain from making extended reports or transacting personal business over the telephone after completing installation or repairs.

(39) Notify the customer when leaving the premises, then do so quietly as possible.

V V

Maj. Gen. G. I. Back Named To Receive IRE Fellowship

Maj. Gen. George I. Back, Chief Signal Officer of the U. S. Army, has been named to receive the highest membership award of the Institute of Radio Engineers (IRE), that of Fellow.

IRE, from its headquarters in New York City, has announced that it will confer this honor upon General Back "for his leadership in the field of military communications and communications systems."

The award will be made at the 1955 annual convention of IRE during Mar. 21-24 at the Waldorf-Astoria in New York City. Seventy-five other members of IRE also were selected for the honor.

The Army Chief Signal Officer has the distinction of being the only person in the Armed Forces to be honored this year by being made a Fellow in the IRE. He is the first Signal Corps officer on active duty in the 42-year history of IRE to be selected for the top membership award.

General Back is a veteran of World War I, World War II and the Korean conflict. During World War II he was assigned as Chief Signal Officer, Mediterranean Theater of Operations, and following this assignment became Chief, Army Communication Service, Office of the Chief Signal Officer. In 1947 he was assigned as Chief Signal Officer of the Far East Command and, with the outbreak of the Korean conflict, was additionally assigned as Chief Signal Officer, United Nations Command. He was appointed Chief Signal Officer of the Army in May, 1951.

He's using the telephone that lends an extra hand

"Sure . . . I'm looking up the figures right now!" From busy executives to clerks, people in business can work more easily and efficiently with Bell's new Distant Talking Telephone. Small white rectangle is the loudspeaker.

For people who want to keep *both* hands free when they telephone, Bell Telephone Laboratories engineers have devised a new telephone with a sensitive microphone in its base.

To use it, simply press a button. The microphone picks up your voice and sends it on its way. Your party's voice comes to you through a small loudspeaker. Both hands are left free.

The volume can be adjusted to suit yourself. If privacy is needed, you simply lift the handset; this shuts off the microphone and loudspeaker and you talk just as you would on a regular telephone.

This new development of Bell Laboratories increases the number of ways your local Bell telephone company can serve in businesses and homes.

Pencil points to microphone in base of new telephone. Left-hand button controls volume, center one turns set "on" and lights up while in use. The third is an "off" button.

Bell Telephone Laboratories

Improving telephone service for America provides careers for creative men in scientific and technical fields.

COURTS and COMMISSIONS

Pacific T&T Rate Increase In California Asked

An application for an annual rate increase of $4,980,000 was filed with the California Public Utilities Commission by the Pacific Telephone & Telegraph Co., which contended on Nov. 20 the boost is necessary to offset recently granted higher wages.

A company spokesman said the increase included an allowance for a 52 per cent federal corporate income tax.

California rate increases totaling $18,171,000 annually have been granted the company since 1952, including a $7,071,000 boost approved Aug. 17 and an $11,000,000 raise granted July 6 (TELEPHONY, Sept. 4, p. 32; July 17, p. 39).

If it approves the new request, the commission will decide how the higher rates will be applied to residence, business, paystation and long distance calls.

In a statement commenting on the application, B. S. Gilmer, vice president of the company's California operations, declared:

"This request covers only the cost of wage increases recently made effective following union wage settlements. These wage settlements were being negotiated at the time the July 6th order was issued and their cost was not provided for in the order. Since payroll costs make up more than half our operating expenses, wage increases have a heavy impact on our earnings.

"Under the stringent regulation of the California commission, there is no room for absorption of such cost increases. The additional revenue the company seeks at this time will merely restore the company's earnings to the level authorized by the commission's decision on July 6th this year. This is necessary if the company is to be in a financial position to provide for the full telephone needs of its service areas in California."

The requested increase is supplemental to an application filed on Dec. 2, 1952, on which the previous two rate increases were granted by the commission.

V V

New England T&T Petitions For $6,500,000 Increase

On Nov. 20, the New England Telephone & Telegraph Co. petitioned the Massachusetts Department of Public Utilities for approval of a revised rate schedule in that state to provide about 6½ million dollars, or an increase of about 4 per cent in annual revenues. The company has about 1,134,000 residence customers and 165,000 business customers in the state.

This action by the company was in line with the September decision and order of the supreme judicial court of that state, which remanded the pending rate case to the commission for further consideration, and supported the company's contention that the rates the commission authorized would not permit earnings at the minimum rate specified in the board's order (6.313 per cent on the rate base) (TELEPHONY, Oct. 2, p. 38).

Hugh W. MacDonald, Massachusetts general manager, said that the major reason for the failure of present rates to provide the authorized earnings is the big increase in the company's investment since the public utilities department reviewed the situation. Since December, 1952, when the present rates were filed, the investment in Massachusetts intrastate plant has been increased by about 50 million dollars. On the basis of the increased investment alone the company would have had to seek additional revenues to bring its

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earnings up to the minimum level. This accounts for the major increase sought. But since the supreme court remanded the case to the commission two other factors have increased the annual expenses. One is a wage increase bargained in October, and the other is an allowance for part of the expenses occasioned by Hurricanes Carol and Edna on and after their impacts of Aug. 31 and Sept. 11.

V V

Independent in North Carolina Requests $159,165 Rate Raise

The Norfolk & Carolina Telephone Co., Elizabeth City, asked the North Carolina Utilities Commission Nov. 22 for authority to increase its rates an estimated $159,165 a year, effective Jan. 1.

The company said the additional revenue, which would net it an additional $67,506.59 after taxes, is needed to increase its rate of return.

It said operating cost "continues at a high rate and is the highest in history," and that this "results in a dangerously low rate of return on the cost of plant used and useful in furnishing telephone service to the public." It recalled that it has applied "for only two small increases" during the past 32 years, and said the increase now being asked was requested only as a last resort.

During the 12 months ended Sept. 30, it earned a return of 4.15 per cent, the company said, and would have earned 7.12 per cent, or 6.65 per cent after adjustments, if the new rates had been in effect. It said a higher return is necessary in order to attract capital for needed additions and improvements to its system, including a new automatic exchange at Edenton.

The company recently applied to the commission for permission to issue 2,000 shares of common stock at not less than $100 per share in order to pay off a $200,000 bank debt due in December (TELEPHONY, Nov. 27, p. 33).

Under the proposed new rates for one-party, two-party, four-party and multi-party service, the increases at the various exchanges would be as follows:

Elizabeth City — business: $9.75, $8.25, $7.50 and $5.00, compared with $6.75, $5.25, $4.25 and $2.75 now. Residence: $5.50, $4.25, $3.75 and $3.75, compared with existing rates of $4.00, $3.25, $2.75 and $2.00.

Edenton—business, $7.75, $7.00, $6.25 and $4.50, compared with $5.25, $4.25, $3.50 and $2.75. Residence: $4.75, $3.75, $3.25 and $3.25, compared with $3.75, $3.00, $2.50 and $2.00.

Hertford and Manteo — business: $6.75, $6.00, $5.25 and $4.00, compared

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Sunbury and Coinjock — business: $6.50, $5.75, $5.00 and $4.00, compared with $4.00, $3.25, $2.50 and $2.50. Residence: $4.00, $3.50, $3.25 and $3.25, compared with $3.00, $2.50, $2.00 and $2.00.

At Kill Devil Hills the rates would remain unchanged. The business rates are $12.50, $10.00, $8.00 and $6.50 and the residential rates are $10.00, $8.00, $6.00 and $5.00.

V V

North Carolina Commission Authorizes Common Stock Issue

Central Telephone Co., Charlottesville, Va., was authorized by the North Carolina Utilities Commission on Nov. 19 to sell 45,000 shares of $10 par value common stock. (The company's North Carolina headquarters are at Mount Airy.)

Proceeds from the stock, which will be sold to the firm's parent company, Central Electric & Gas Co., Lincoln, Neb., at a price of not less than $14 per share, will be used to carry out Central's expansion and improvement program.

V V

Oregon Commissioner Approves West Coast Company Bond Issue

Authority to sell at par a 3-million-dollar principal amount of first mortgage 3⅜ per cent bonds due 1980 was granted to the West Coast Telephone Co., Everett, Wash., by the Oregon Public Utilities Commission on Nov. 22.

The commissioner approved use of the proceeds for reimbursing the company's treasury to cover expenditures for construction, completion, extension and improvement of its facilities, and those of its subsidiaries; also to cover retirement of its short-term bank loans.

V V

Petition of New York Company Scheduled for Hearing

On Dec. 3, the New York Public Service Commission was to have heard the petition of Ausable Valley Telephone Co., Inc., Keeseville:

(a) for approval of amendment of certificate of incorporation;

(b) for authority to exchange 242 outstanding shares of $25 par value common stock for 1,936 shares of new no par value common stock;

(c) for authority to issue and sell 600 shares of $100 par 5 per cent preferred stock, and

(d) for authority to transfer $42,350 from surplus to capital.

REA Approves 500th Loan In Rural Telephone Program

The REA on Nov. 19 approved the 500th loan contract in its rural telephone program, the U.S. Department of Agriculture announced.

Loans in the program which became five years old on Oct. 29, now total $219,253,000 to serve 438,243 farm families and other rural subscribers. So far the program has benefited about 125,000 rural subscribers, with improved or initial service on systems which have already completed all or part of their construction.

The Nov. 19 contract provides loan funds amounting to $240,000 for the Pleasanton (Kan.) Telephone Co., to use in improving and extending service in rural areas of Linn county, Kan., and Bates county, Mo.

The company will provide modern dial service through its Pleasanton, Foster and Hume exchange offices for 756 present subscribers and 137 applicants who do not now have telephones. Service will be continued to 37 "switcher" subscribers who own their own lines.

The REA loan funds also will be used to build 43 miles of new line to be added to the present system of 150 miles of line.

An amount of $166,000 had previously been set aside by REA as an allocation for the Pleasanton company soon after its application for a loan, but revisions in the original plans brought the total to $240,000 in the contract signed on Nov. 19.

History of the Pleasanton Telephone Co. is similar to some others which have been financed by REA. It began service in 1902 and has been owned and operated by a single family since 1907. Samuel Tucker became manager of the company in that year, and president as well as manager in 1923. In 1947 he retired from the managership, turning it over to his son, C. E. Tucker, but he continues as president.

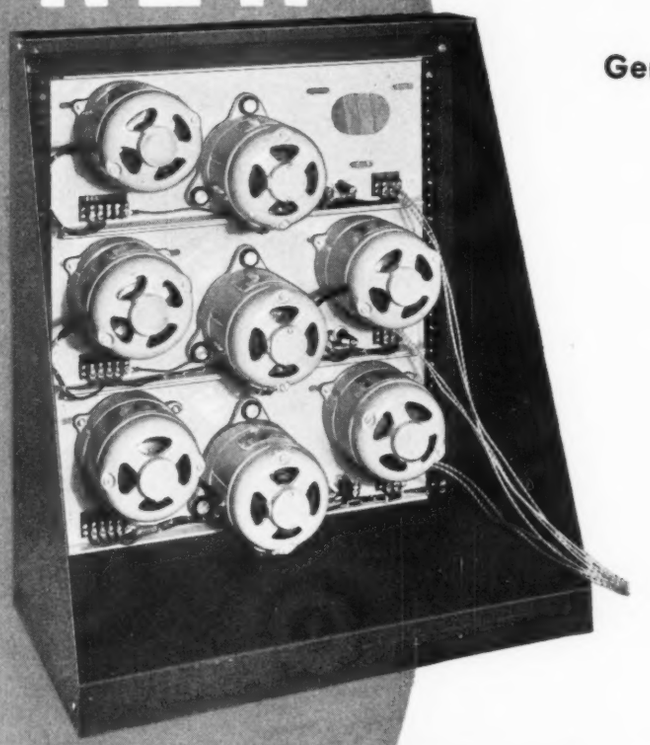
Samuel Tucker has long been active in telephone association work. He became a director of the Kansas Telephone Association in 1910 and served as president of that organization from 1926 until 1947. He also filled the position of director on the board of the United States Independent Telephone Association from 1930 to 1947. Since 1923 he has been a member of the Independent Telephone Pioneer Association.

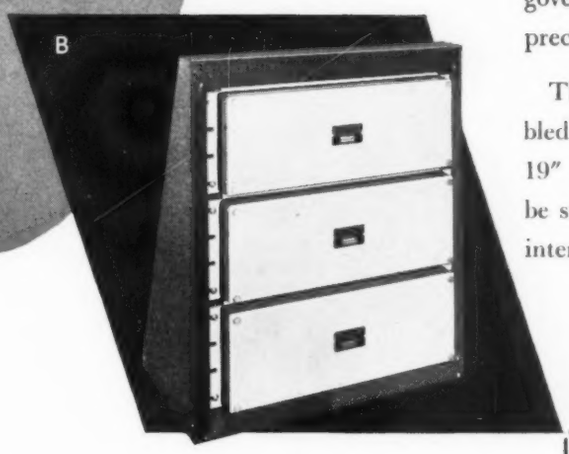
V V

"The greatest protection to our system is to create more capitalists."— ROBERT E. WOOD, *former chairman, Sears Roebuck & Co.*

NEW

Low-Cost Holtzer-Cabot Five Frequency Motor-Generator Set





Generates harmonic, synchromonic or decimonic series of frequencies

This new Holtzer-Cabot ringing machine gives first-rate performance through long periods of service, yet is low in initial cost and requires practically no maintenance.

It is capable of generating harmonic, synchromonic or decimonic series of frequencies, with an output of 15 watts for each of the basic frequencies.

The generators used are of the permanent magnet type and cannot be demagnetized by short-circuits or disassembly. No insulating transformers are required. The unit is cog-belt driven by synchronous AC motors and governor-controlled DC motors to ensure precise frequency regulation.

The panel is furnished completely assembled and drilled for mounting on standard 19″ or other size relay racks. Each set can be supplied with a dial tone generator and interrupters if required.

A—Rear view

B—Front view, with covers

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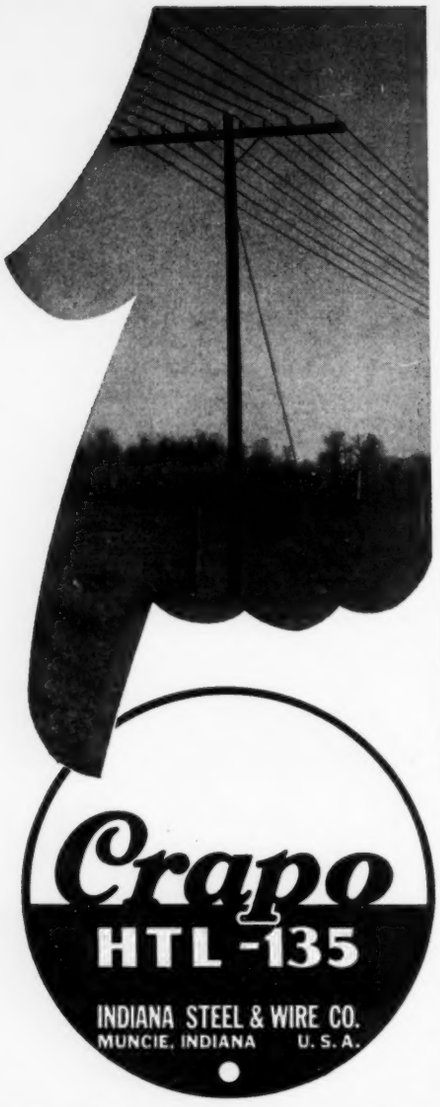

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Utility Management Workshop Open to Telephone Companies

"Human Relations" will be the theme of the 1955 Utility Management Workshop, the executive development and training conference held annually by Columbia University's department of industrial and management engineering, at Harriman, N. Y., May 15-27.

Instead of a lecture series, the workshop is a "do-it-yourself" experience. Approximately 40 specially selected top-management executives will live together and work together to solve problems posed by the university staff and a corps of visiting experts. The industry participants work in small "task force" groups applying their own experience and knowledge to the problems set forth.

The workshop is under the direction of Professor Robert Teviot Livingston, author of *The Engineering of Organization and Management*, and director of education and commercial research, The Long Island Lighting Co. Participation in the workshop is open to nominees from private utility, airline, railroad and transportation companies.

Among telephone companies which have participated in the workshop are: American Telephone and Telegraph Co.; New Jersey Bell Telephone Co.; California Water & Telephone Co., Monrovia, Cal., and West Coast Telephone Co., Everett, Wash.

V V

Subscribers Finance Michigan Company's Conversion

The Alger (Mich.) Associated Telephone Co., a new corporation capitalized at $50,000, officially inaugurated modern automatic service on Nov. 4—the conclusion to a "do-it-yourself" program carried out by local telephone officials and Alger citizens.

A luncheon to celebrate the occasion was sponsored jointly by the ladies of the local Methodist and Catholic churches and held at the Moffatt Township Hall. The luncheon was attended by many prominent persons in the telephone industry, as well as local civic leaders and interested citizens.

Speakers congratulated the company on the job it had done in bringing automatic service to the community in such a short period of time, outlining the many difficult problems involved in such an expansion program.

Robert R. Day, attorney for the Alger company and one of its directors, served as toastmaster and recalled the type of telephone service provided to the area during the earlier days when there were only two lines connected to a jack type box switchboard which had been located for over 39 years in the general store at Alger. For over 36 years, the store and the switchboard have been operated by Mr. and Mrs. Timothy Strohauer. Mr. Day also pointed out that the present company was entirely financed by money received from local people through the purchase of stock.

Special congratulations by James A. Beery, president of the newly formed Alger Telephone Co., were directed to the original local committee which planned the conversion.

Other speakers were Russell Schafer, president of the Michigan Independent Telephone Association, also president of the Pinconning Telephone Co.; Fred Twigg, executive secretary of the Michigan Independent Telephone Association; Cash Smith, Independent company relations representative of Michigan Bell Telephone Co.; Lawson Chambers, president of the Ogemaw Telephone Co., and others.

V V

OBITUARY

C. A. SWOYER of Columbus, O., well-known-telephone man and TELEPHONY correspondent for over 40 years, died on Nov. 13.

Mr. Swoyer, upon his retirement in 1949, was an employe in the plant department of the Ohio Bell Telephone Co., having completed 44 years of service in the Bell System in February of that year. He also was serving as the chairman of the historical committee of the Telephone Pioneers of America in Ohio, indulging in a hobby which brought him wide recognition, and which he continued upon retirement—research on the history of the Bell System and on the telephone in Ohio.

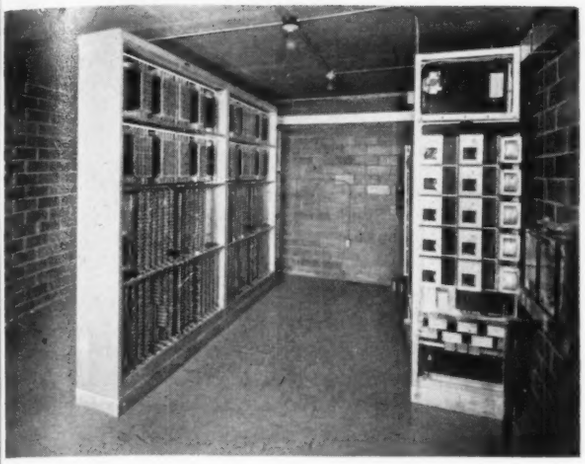
In 1953 Mr. Swoyer was curator of the Ohio State Museum in Columbus where Ohio Bell had its "Cavalcade of Communications" exhibit, and which, according to Curator Swoyer, attracted 220,000 visitors in 16 months.

In November, 1953, as part of a half-hour telecast over station WBNS-TV, Columbus, O., celebrating the 50-millionth telephone, Mr. Swoyer displayed his famous collection of telephone song sheet music as well as part of his collection of old telephones.

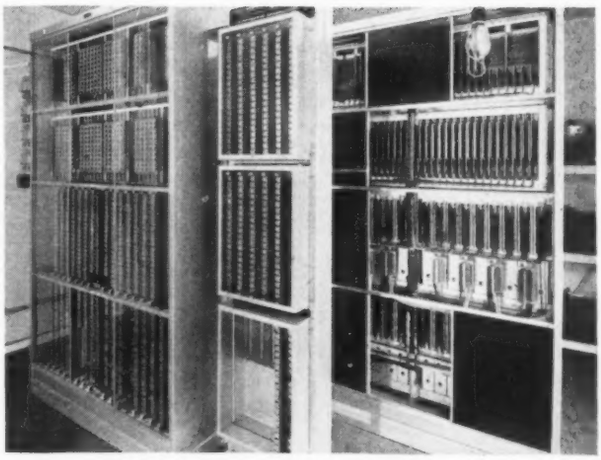
Mr. Swoyer is survived by his widow and a daughter, Mrs. Peter D. Young.

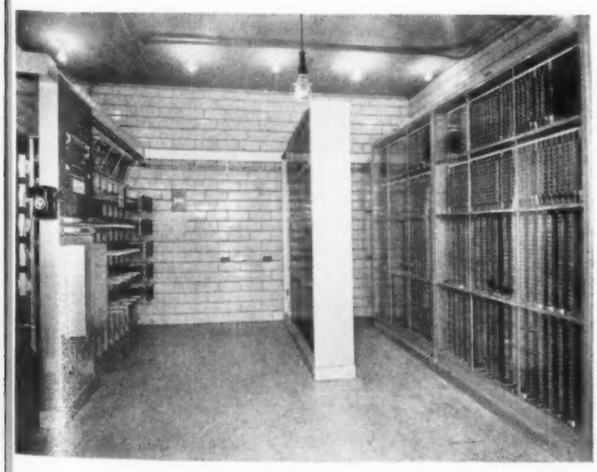
V V

"[Deficit spending] ignores the pain resulting when the old and especially the young pay income tax for interest on the debt."—HERBERT HOOVER, former President of the United States.



LEICH DIAL SYSTEM





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GENERAL SYSTEM

PLANT MAN'S QUIZ

Q. We are seriously considering the installation of a large number of outdoor booths for coin type public telephones in our area. Due to a shortage of circuit facilities in many areas under consideration, we contemplate the use of party lines. Will it be possible to utilize multi-party prepay paystation lines in the provision of this service? If so, how will they operate?

A. An experimental installation has recently been made in Ohio of a four-party prepay paystation line. In the past few years, operating companies have found an increasing demand for paystation service. Moreover, paystations have proved profitable in new locations not previously considered suitable, especially when the 10-cent rates are introduced. At the same time, the proportion of paystations of the prepay type has tended to increase.

While the ordinary prepay coin station is usually satisfactory in urban areas where the loop to the station is short (in terms of distance), circumstances do arise wherein the expense of providing a separate pair for each station is prohibitive. In regular station operation, the solution to this problem is the party line. Heretofore, only the postpay type of paystation has been usable on party lines because the presence of a second station on the line interferes with the coin collect and refund operations of the prepay type.

However, it has been found that the use of postpay stations in an area in which the prepay type is standard has a tendency to confuse customers. The prepay party-line paystation was developed to avoid the need for using both types of equipment in one area.

Typical locations might be in filling stations, restaurants, taverns, isolated booths, etc., located on highway intersections. All of these possible locations have the following conditions which indicate the use of equipment of this type: extensive use by transients, so that coin service is essential; low calling rate per station, so that a single-station line is not loaded efficiently; and very long lines, so that the line investment is disproportionately high.

There is another possible use for this type of equipment which appears promising. Sometimes it is necessary to provide more paystations in factories than the daily traffic would justify because such traffic occurs in short periods such as coffee breaks and the noon hour. If the several stations on a line could be located each in different factories or departments and the breaks and lunch hour could be staggered, some economy of outside plant would be realized. Such an arrangement would prove especially desirable if the factory area were located some distance from the central office.

The multi-party prepay paystation lines use regular prepay paystation instruments, modified by the addition of an extra pair of springs on the hookswitch. Some additional equipment (transistors, relays, and a small power pack) is mounted in the ringer box. A "line-busy" indicator lamp is mounted above the instrument. A connection to the 110-volt commercial power supply is required which is usually available at the booth for lighting purposes.

The function of the auxiliary equipment at the station is to disconnect the telephone instrument from the line in response to a tone signal from the central office. However, the equipment at the station in use, is prevented from

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disconnecting that station by the special springs in the hook-switch which open when the handset is removed. The central office equipment sends out a spurt of "disconnect" tone immediately when the line is seized.

Whenever a station is disconnected, the busy-line indicator lamp lights to notify would-be users. When the line is released, another spurt of tone, of a different frequency, is sent out to cause the disconnected stations to be reconnected. The tones are of such high frequency that they cannot be heard in the telephone instrument.

Before attempting to use the pay-stations, the condition of the busy-line indicator lamp should be observed to ascertain that the line is not busy. If the user ignores or fails to observe a lighted busy indicator, he will be unable to make his call because the instrument is physically disconnected from the line.

Coins deposited at this time are not lost as they may be recovered by flashing the hookswitch, after the call then in progress has been completed.

Except for the necessity of observing the busy lamp before making the call, the user's operations are the same as on an individual paystation line. In the experimental installation, reverting calls must be placed through the operator, who must supervise the collection of the coins. On a typical installation, reverting calls will be so few that handling them in this manner will not prove objectionable.

Special line adapters are required on each line in the central office. In addition to the equipment used on standard paystation line adapters, extra equipment is provided to send the disconnect and reconnect tone pulses and to provide direct access to the operator for reverting calls.

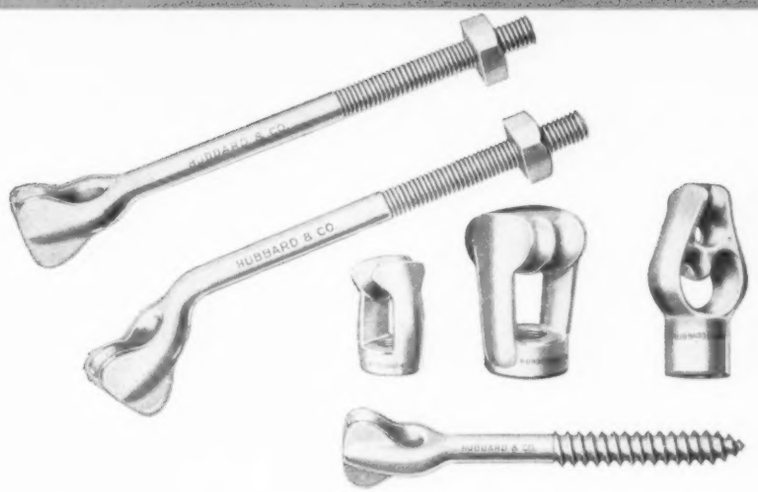
• • •

Q. Will it be possible to use selective ringing on a rural line type subscriber carrier system?

A. We have checked with one manufacturer and are advised that their carrier channels may be had with fully selective divided ringing up to 10 telephones, or with selective ringing for five telephones or coded ringing for 10. This carrier will transmit all ringing frequencies for harmonic, decimonic, synchromonic or straight line ringing.

Four channels of this system can be "stacked" on a single line without affecting the capacity of the physical circuit. Thus, as many as 50 telephones, with fully selective ringing for all, can be served with one pair of wires, where multi-party service is satisfactory.

HUBEYE BOLTS, EYES, AND NUTS



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UNDERGROUND

Cable Racks—Manhole Ladders and Steps Pulling-in Irons—Expanding Anchors Cable Shields—Screw Steelwing Anchors Anchor Rods—Ground Rods and Clamps

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Farmers Paying Slightly Higher Telephone Rates

Payments by farmers for local telephone service continued to increase during the latter part of 1953 and the first half of 1954, according to a survey made by the Crop Reporting Board of the United States Department of Agriculture. In July, 1954, they averaged $3.33 a month or 3 per cent above a year earlier.

This was the smallest annual increase in local rates both percentagewise and in actual amount since 1947. Total monthly charges for both local and long distance services averaged $4.92 per farm with telephones compared with $4.95 for July 1953. For the most part, the increase in local bills was accompanied by an increase in quality of service as more telephones transferred from manual to automatic service, according to the report.

Increases in average telephone bills for local service this year occurred in practically all states with only the Pacific states showing declines and with the Middle Atlantic states (New York, New Jersey, and Pennsylvania) holding steady.

The South Central and Mountain states showed the greatest increase. As of July 1954, the highest rates for local telephone service were paid by farmers in the New England states while by far the lowest charges were paid by farmers in the West North Central region, states the Department of Agriculture.

On July 1, 1954, the percentage of farms with telephones, at 44.3 was the highest on record. This compares with 42.5 per cent a year earlier and was two-thirds higher than in 1940. However, in the 20 years prior to 1940, the percentage of farms with telephones declined rather sharply. According to the U. S. Census, in 1920 about 38 per cent of the American farms had telephone services.

Although the percentage of farms with telephones is at a record high, the total number of farms with telephones, although having increased rather steadily over the past several years, is still below the 1920 figure.

According to the survey about 4 per cent of all farm telephones on July 1 were on a one-party line, 20 per cent on two to four-party lines, 43 per cent on five to eight-party lines and 33 per cent on lines with nine or more parties. This distribution showed a slight increase for both the two and four-party lines, and four and eight-party lines, and a corresponding decrease for the nine-and-over party lines compared to July 1, 1953.

By type of service, about 35 per cent of the farm telephones were magneto type, one-fifth were common battery type, and 45 per cent were automatic telephones.

Average Monthly Local Farm Telephone Bills, by Regions, July, 1947-54[1]

Regions	1947	1948	1949	1950	1951	1952	1953	1954
	Dollars							
New England	2.85	3.10	3.55	3.70	3.83	3.91	4.11	4.23
Middle Atlantic	2.58	2.83	2.86	3.06	3.24	3.32	3.39	3.39
E. N. Central	2.02	2.26	2.39	2.59	2.81	2.97	3.23	3.32
W. N. Central	1.62	1.82	2.00	2.19	2.41	2.59	2.71	2.75
S. Atlantic	2.26	2.58	2.91	3.08	3.22	3.48	3.61	3.75
E. S. Central	2.14	2.58	2.78	2.98	3.08	3.18	3.23	3.42
W. S. Central	1.50	2.24	2.31	2.32	2.63	2.95	3.25	3.46
Mountain	2.60	2.60	2.75	2.95	3.02	3.43	3.55	3.74
Pacific	2.82	3.17	3.26	3.52	3.64	3.82	4.00	3.93
United States	2.05	2.33	2.49	2.67	2.87	3.06	3.24	3.33

[1]The survey made in July and August requested data based on "last bill." This was generally a bill for a period ending in late June, July, or early August.

V V

British Columbia Company Extends Carrier Network

The second phase of a $2,500,000 British Columbia Telephone Co., Vancouver, B. C., Canada, long distance project started in 1951 has been completed, with the opening of a second carrier system to provide additional circuits between Vancouver and Prairie and eastern Canada points.

Company officials state the new system adds 10 channels to the trans-Canada hookup, increasing facilities between the company and points in Canada by 16 per cent.

First part of the project began three years ago with erection of a chain of repeater stations from Vancouver to the Alberta border and construction of a new pole line over the Hope-Princeton highway to by-pass the difficult Coquihalla Pass.

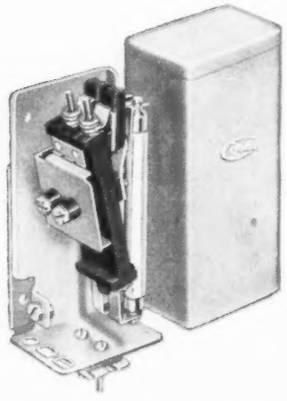
Fifty per cent of B. C. Telephone Co. long distance circuits are now obtained by use of carrier equipment.

Construction m
and
WITH THE DOUBLE GUA
STROMBERG-CARLSON AND
LEADING MA

cook type RO

outdoor sub-station protector

A very rugged Protector, assembled on a bracket of heavy steel—instead of porcelain—to take rough handling and subscriber abuse without danger of breakage. Other outstanding features:



1. Uses a Cook Standard Type H Protector unit with molded bakelite base for high resistance to electrical and physical shocks.
2. Protector unit contains both primary and secondary arresters. The secondary arrester provides a path to ground for lightning should the fuses be blown.
3. Mountings contain heavy studs for connecting drop wires and ground.
4. Equipped with heavy zinc weatherproof hood, and bracket for mounting on post, wall, etc.
5. All structural parts, including hood and bracket, are grounded.

n materials
d Supplies
BLE GUARANTEE OF
ON AND AMERICA'S
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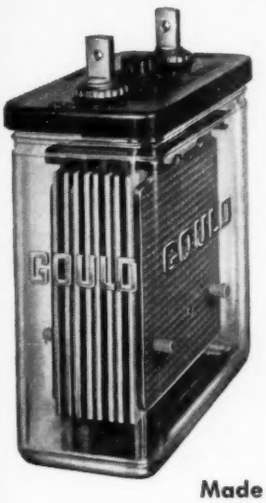
the battery that lasts practically forever



gould planté

For long life and uniform dependable service, no other telephone battery equals the Gould Planté. It has rolled up amazing performance records, remaining in active full-float service for 20 years, 30 years and longer!

In the Planté, *all* of each positive plate is pure lead, containing *no* antimonial impurities. Thus, Gould has eliminated the primary cause of self-discharge, capacity losses and shortened battery life. Planté batteries float at constant voltage and maintain rated capacity all their life. Because they almost never need service, maintenance is negligible. If you would cut battery costs to a minimum, choose Planté.

Made by **GOULD-NATIONAL BATTERIES, INC.**

long life
telephone dry cells

"Eveready" "Columbia" "Gray Label"

• Higher sustained voltage • Longer life • Rock-bottom economy.

These qualities, more important now than ever before, are assured through the constant supervision of America's largest dry battery laboratory.

Made by the makers of "Eveready," "Air Cell" Operators' Transmitter Batteries.

The quality cell preferred by telephone engineers

better than ever!

DIAMOND C POLES

For durability, use DIAMOND C

COLFAX LUMBER & CREOSOTING CO., INC.

because they're made in a new and modern plant

Something new has been added!—at Pineville, Louisiana—a modern, enlarged creosoting plant offering faster delivery and better-than-ever quality in telephone poles of this well-known, well-liked brand.

Diamond C poles are made of Southern pine, carefully selected from live growing trees and graded according to physical properties desired. Each pole is pressure-treated with 8 lbs. (or more if you wish!) of grade No. 1 Creosote Oil, in accordance with AWPA specifications.

Reduce loss in revenue due to pole failure. Buy Diamond C from S-C!

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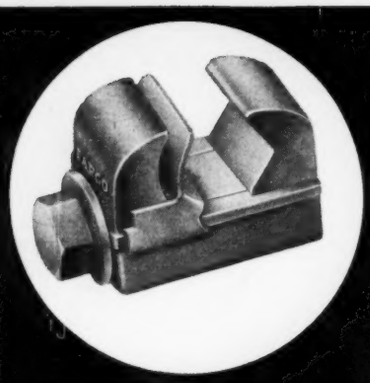
Sound and Public Address Systems

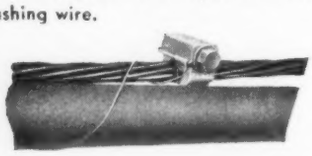
"Panoramic Vision" Television Receivers

AND MANY OTHER ELECTRONIC PRODUCTS FOR OUR ARMED FORCES



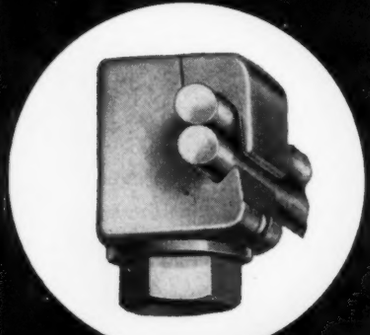
FARGO
LASHING WIRE CLAMP

Fargo's "B-3" takes any size lashing wire and any size messenger up to 25M (½"). Made of malleable iron with Tin-Zinc alloy plating. Uses the "one-piece", "vise-type" design for ease of installation and low wrench torque with high compression. A "V" groove centers the messenger in the clamp . . . a shoulder on the stainless steel pressure bar positions the lashing wire.



FARGO "5000" CONNECTORS

Fargo "vise-type", "one-piece" connectors are an ideal, easy to use unit for bridging connections. Available in sizes from No. 8 to 1,000 MCM.



FARGO

Manufactured by
FARGO MFG. COMPANY, INC.
Poughkeepsie, N. Y.

IN THE NATION'S CAPITAL

Continued from page 18

utility association objection is part of a left-wing philosophy which would seek to promote the idea that public utility enterprise is in some way reprehensible.

During the peak of the anti-utility agitation of the early 1930's, the late humorist, Will Rogers, used to make jokes about the political hysteria of that day. He sarcastically referred to a letter he got from a nice old, hard-working mother who confessed that she had tried to raise her son right, and had given him a good education by scrubbing floors, but alas, "then he turned around and went to work for a public utility company."

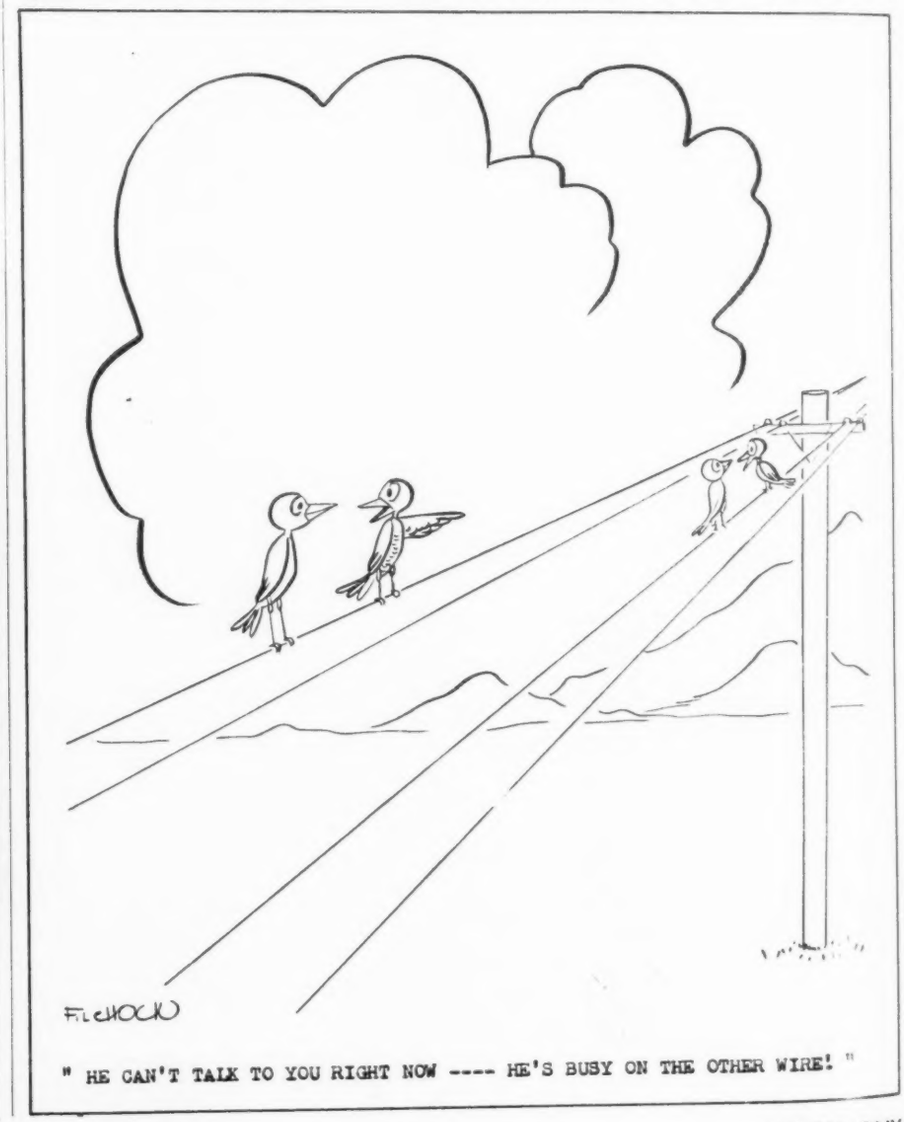
Are we heading in the direction of this kind of hysteria again? The American Bar Association as well as other national professional associations may want to take a look at this novel suggestion that employment or association with a public utility company in some way operates to make an otherwise qualified professional man some kind of a second class citizen, and that—like Communists, ex-convicts, etc.—they might be barred from holding public office.

REA Phone Loan Policy

The Agriculture Department release about farm telephones came shortly before the news that REA had approved its 500th loan contract since the program began Oct. 29, 1949—five years ago. These loans now total $219,253,000. The benefits were estimated to result in serving 438,243 farm families and other rural subscribers.

The REA telephone loan program—unlike the REA rural electrification program—does not function on a state allocation basis. By that is meant a restriction on the percentage of loans which may be made to any one state. The rural electrification program has such a restriction imposed by statute.

Now that REA is approaching the end of its rural electrification program as far as connecting new farms to central station service is concerned, the restriction on the number of loans which may be made in any one state is not so important as it used to be.



" HE CAN'T TALK TO YOU RIGHT NOW ---- HE'S BUSY ON THE OTHER WIRE! "

REA's Ancher Nelsen wants to have Congress remove the so-called "state allotment" formula so that REA can make rural electrification loans without regard to state quota, just as it now makes rural telephone loans without regard to state quota. It is probable that the next session of Congress will make the necessary changes to put both REA programs on the same footing.

Speaking of REA farm telephone loans policy, an important general review of this subject was made by the chief of the REA telephone operations and loans division, E. C. Weitzell, in a speech to the Oklahoma Independent Telephone Association on Nov. 4, 1954. The text of this address is likely to be published in TELEPHONY in a forthcoming issue. By the way of summary, however, the main points covered by Telephone Chief Weitzell were as follows:

(1) It was the intent of Congress that REA avail itself of the "know-how" which exists in telephone companies, cooperatives, and mutual groups already in business, rather than attempt to develop new organizations, except under circumstances where existing agencies are not interested or are unable to carry necessary service loads.

(2) REA is not promoting any particular type of organization, but it will insist that the taxpayers' money be used for loans to finance up-to-date rather than inadequate or obsolete types of service.

(3) REA is required by statute to concentrate on truly rural service in unserved areas; and for this reason REA will insist that companies obtain *complete* financing, as distinguished from piecemeal projects.

(4) REA is not interested in obtaining control over the management of its borrowers. It would prefer, if it were possible for the loans to be handled in an efficient manner, to be freed from the responsibility of giving direct attention and assistance to borrowers. But where it is necessary, such assistance is generally welcomed.

(5) The loan contract and mortgage forms have been developed with the assistance of USITA and other representatives of the telephone industry.

Chief Weitzell had some other important things to say about the lowest practicable costs, connecting company relationships, and the future of the Independents. The main point stressed was the attitude of the present top officials of REA in trying to work out loan policies in such a way as to be useful to all potential borrowers without discrimination. He said that he believed "the objectives and aims of the Independent telephone industry and those of REA are identical and that we are working toward a mutual objective."

He thought there should be no feeling that REA is trying to "crowd anybody out" either from the operating company point of view or from the independent financing point of view. In short, Weitzell thinks there is plenty of room for everybody who is honestly and intelligently interested in promoting rural telephone service. He pointed out that "where the Independent company can obtain adequate and suitable financing from private interests, this source of capital should be encouraged and fully utilized."

V V

That which is everybody's business is nobody's business.—IZAAK WALTON.

Ohio Bell Company Elects W. H. Chase, Vice President

Warren H. Chase, assistant vice president of the Ohio Bell Telephone Co., was elevated to vice president on Nov. 26 at a meeting of the company's board of directors.

An electronics expert and veteran of 35 years in the business, Mr. Chase heads the administrative staff organization dealing with over-all company operations. His advancement to the vice president's post will be effective Dec. 1.

Mr. Chase attended Hiram College, Case Institute of Technology and Har-

ANOTHER GREAT VALUE—WD 12

We were one of the first to introduce you to the popular DIA, Plastic and Nylon all purpose wire. Since the supply of this wire has just about "Dried-Up," we now introduce you to an even Better and Superior ALL-PURPOSE—HIGH QUALITY WIRE; recently manufactured by Anaconda Wire & Cable Co.—**BRAND NEW.**

CONSTRUCTION: Each conductor #18 Gauge, consisting of 4 Steel and 3 Copper Strands. TWO Conductor, TWISTED, with 3/64" Polyethylene Insulation on each conductor.

Full, **ONE LENGTH,** ONE MILE or ½ MILE LENGTHS on STEEL REELS.*

BREAKING STRENGTH: 300 pounds.

ESTIMATED SERVICE LIFE: Approximately 5 years or more.

SPLICING: Can be spliced with Nico-Press Sleeves, #3-045-B and Plastic Tapes such as Bi-Seal, Scotch Tape, Etc.

RESISTANCE: 186 Ohms per Loop Mile.

PURPOSE: Can be used as Emergency Wire.
For Pole Moving Projects or Highway Jobs.
As Temporary Drop Wire—Jumper Wire—Bridle Wire.
Make your own cables.
As Rural Distribution Wire or Cable instead of running additional iron wire, new poles, etc. Hang on existing Pole Lines. Get Increased Capacity and Better Service with a minimum of additional cost. Can also be used as Direct Burial Wire.

PRICE:	1— 5 Miles	$42.75/Mile DELIVERED
	6—10 Miles	$42.00/Mile DELIVERED
	11—25 Miles	$41.25/Mile DELIVERED
	26—50 Miles	$40.50/Mile DELIVERED

TERMS: 1% 10 Days, Net 30; FULLY GUARANTEED.
WE PAY THE FREIGHT CHARGES.
*Reels are NON-RETURNABLE. NO DEPOSIT REQUIRED.

DELIVERY: From Stock.

SAMPLE ON REQUEST

Try Some Now!! ORDER TODAY!!! FULLY GUARANTEED TO BE *NEW* AND TO YOUR SATISFACTION.

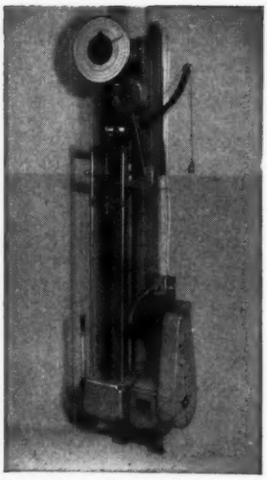
TELE-WIRE SUPPLY CO., INC.

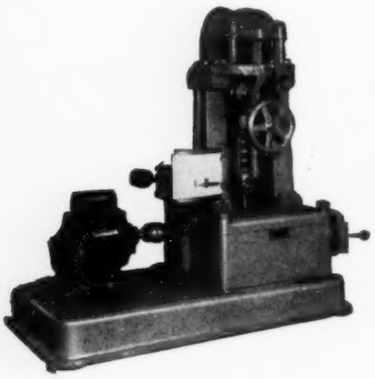
Distributors of Telephone Supplies

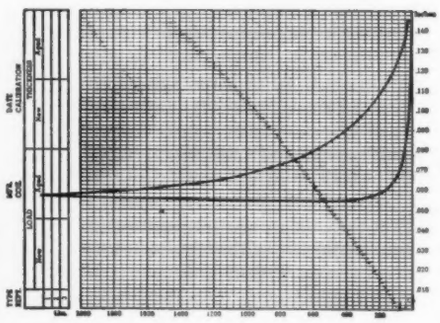
HAnover 2-9690

136 Maiden Lane **New York 38, N. Y.**

With labor and maintenance costs much higher today than some years ago, it is natural for telephone companies to insist on installing drop wire that will give long service. Dependability in Lowell's complete line of Telephone Wires is assured by a technical staff using many physical tests to determine the effect of heat, aging, tensile strength, compression, cold, acids, oils, moisture and abrasion. Tensile test machine at right which tests for adhesion enables us to guarantee that the adhesion bond between the insulation and conductor is stronger than the conductor itself.







Compression testing is essential in high grade insulated telephone wires. All Lowell parallel neoprene jacketed drop wire is tested in our laboratory to withstand pressure of 2000 lbs. or more before the insulation jackets are crushed. Since resistance to compression determines the quality of the adhesion these tests prove that Lowell Drop Wire will stand the crushing action of the P Clamp without cracking of the insulation or jacket, thus insuring dependability and long life in service.

"Fine Wires Only"

LOWELL INSULATED WIRE DIVISION
of The Ohmite Manufacturing Company
[illegible] LINCOLN STREET [illegible] MASSACHUSETTS

vard School of Engineering. While most of his telephone career has been spent in Cleveland with Ohio Bell, he also has been associated with the New England Telephone & Telegraph Co. and the Pacific Telephone & Telegraph Co. Before his appointment as assistant vice president in 1950, he had been the company's chief engineer.

V V

Nassau Tops New Orleans In "Talkingest" Populace

H. L. Smith, exchange engineer of the Telecommunications Department, Nassau, Bahamas, writes:

"In your 'Flashes and Plugs' for Sept. 4, I noted with interest that the highest calling rate in the U.S.A. was registered in New Orleans with 8.11 calls per subscriber per day.

"It happens that in my annual report I must state the average calling rate, and in comparing ours with that of New Orleans I found that over the last five years our rate was:

1949	10.5
1950	12.4
1951	14.2
1952	14.4
1953	13.2

"The drop in the 1953 calling rate may be attributed to the fact that we installed a 1,200-line extension to the main exchange, but were unable to put it into service until the latter half of the year.

"Nassau is about 150 miles off the Florida coast and at last census had a population of just over 46,000. We have an automatic system of 3,775 lines with just over 6,000 stations. Early next year we plan to install another 1,000-line extension to our main exchange and, later, a 250-line extension to one of our satellite exchanges."

V V

Houston, Tex., Station Added To Bell Television Network

Station KTRK-TV, Houston, Tex., was connected to the Bell Telephone System's network of television facilities over the Nov. 20 weekend.

The Long Lines Department of American Telephone & Telegraph Co. said network programs are received from Dallas, which is on the company's Omaha-San Antonio radio relay route.

The video signals are fed into a telephone building in Houston and from there to the KTRK-TV studio over a local channel provided by the Southwestern Bell Telephone Co.

With the addition of KTRK-TV, network facilities now link 349 stations in 226 cities in the United States.

TRAINING PROGRAM

Concluded from page 22

hour and a half each week, or they can be programmed for the periods when the work load slacks off enough to permit training sessions.

Generally, a person's interest in his job goes far beyond the hours of the day that he spends on the company payroll. If he is interested in learning he will want to spend some time in home study. By providing material for training that is as suitable for home study as it is for on-the-job study, the telephone company is helping satisfy this desire to learn.

The training program described in this article has been proven successful in hundreds of telephone companies in all parts of the country. It is a low-cost, high-value program that is readily obtainable.

In summary, today, more than ever before, the telephone business must meet the challenge of other industries that beckon young people planning a career. One way to meet this challenge is through a training program that will allow every employe to learn as much and as rapidly as his own ability will permit.

For the small company this must be a program that is low in cost per employe. Also, it should include training on topics that will provide a broad background of knowledge. To do these with material available on the market today, employes should be provided with:

Regular subscriptions to TELEPHONY (Use 10-month introductory subscription order form on page 21.)

ABC OF THE TELEPHONE — Vols. I and II.

The book of Daniel Seitz's articles on CABLE SPLICING, for the cable splicer and cable maintenance man.

The book of Harold B. McKay's articles on CARRIER SYSTEMS for those who engineer, operate, and maintain carrier systems.

With these tools as a starter, the training program for every man can be planned and started in a very short time. After a few months, as the need develops, additional material can be made available from the sources that are continually being suggested by TELEPHONY and in advertisements that appear in that magazine. There is no reason why every Independent company cannot do as good a training job as a Bell company. The important step is to make the decision and then carry out the plan.

That's a modern-day version of what it means to take advantage of opportunities.

FALSE SECURITY

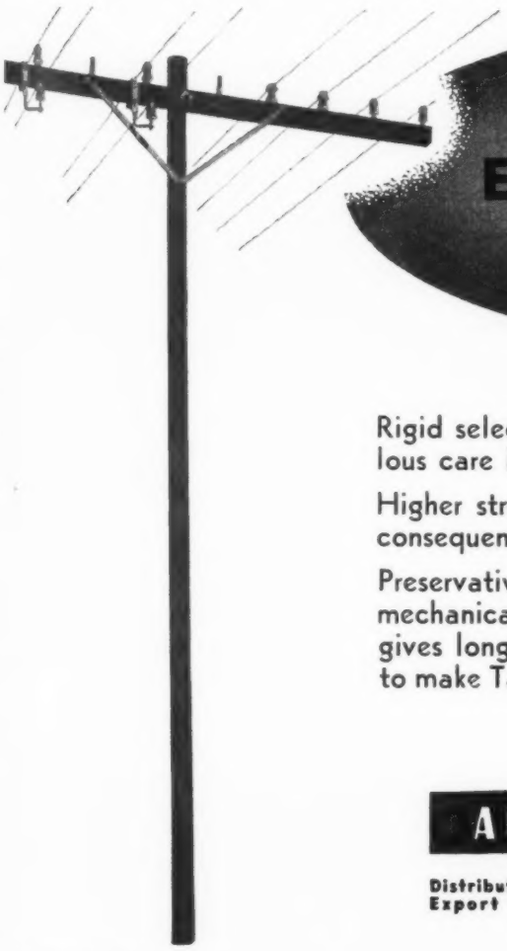
Continued from page 24

or distorted by freezing. Do not mend leaks or breaks by soldering. Soldered joints cannot withstand fire extinguisher pressures.

The number of units of first aid fire protection to be installed should be determined by the inspection department having jurisdiction in accordance with the relative severity of the fire anticipated.

Class I. Light hazard occupancies where, because of relatively small amount of combustibles, incipient fires of minimum severity may be anticipated. Units shall be so located that a person will not have to travel more than 100 feet from any point to reach the nearest unit, but at least one unit shall be required for each 5,000 square feet of floor area.

Class II. Ordinary combustible occupancies, where incipient fires of average severity may be anticipated. Units shall be so located that a person will



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ECONOMY · LONG LIFE
TAYLOR - COLQUITT
SUPERIOR PINE POLES

Rigid selection from choice stands of Southern pine plus meticulous care in handling assure strength to an unusual degree . . .

Higher strength thus obtained permits use of smaller poles with consequent savings in purchase and installation costs . . .

Preservative treatment by highly skilled personnel using the finest mechanical equipment and the best creosote so far developed gives long life . . . combines with timber selection and handling to make Taylor-Colquitt pine poles truly *Superior.*

Recommended and Sold Through Our Distributors

AUTOMATIC ELECTRIC

Distributors in U. S. and Possessions: Automatic Electric Sales Corporation
Export Distributors: International Automatic Electric Corporation
1033 West Van Buren Street, Chicago 7, U. S. A.

ACROSS THE NATION
EVERYBODY
IS FINDING....

Koiled Kords*
PROVIDE BETTER
SERVICE

BETTER FOR THE TELEPHONE COMPANY

BETTER FOR THE SUBSCRIBER

On all new telephones, be sure to specify KOILED KORDS retractile telephone cords, and also use them for replacements as needed. Available from your independent telephone supplier to fit all telephones.

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Box K, New Haven 14, Conn.
*Koiled Kords is a trademark of Koiled Kords, Inc.

not have to travel more than 50 feet from any point to reach the nearest unit, but at least one unit shall be required for each 2,500 sq. ft. of floor area.

Outside fire protection may be advisable where water supplies are adequate. The ordinary sprinkler head with the strut removed, spaced eight to 10 feet apart and fed by piping with sizes usually the same as used for automatic sprinklers are designed to distribute water over the roof or wall and protect buildings against fire in adjacent properties. Advice may be secured from state inspection bureaus.

The test of a fire extinguisher is whether that extinguisher carries the label of the Underwriters Laboratories, Inc. This is a non-profit organization that maintains and operates laboratories for the examination and testing of devices, systems and materials determining their relation to life, fire and casualty hazard. There are a number of types of extinguishers which have not been considered suitable for listing or approved by this highly ethical organization. Expert advice may be had from high-grade extinguisher manufacturers, the local fire department, state inspection bureau, the state college, National Board of Fire Underwriters, Federation of Mutual Fire Insurance Companies, National Fire Protection Association and many other fire protection engineering organizations.

Communication equipment, vital to the everyday life of a community and to its safety, may be lost through false security.

PLANNING CONVERSION

Continued from page 33

well to take advantage of all possible improved methods, materials and advancement in the art that are available to us today. By using an improved instrument, the basic design of which has been developed in the Bell Laboratories, a transmission gain of about 10 db is possible which permits the use of finer gauge cable than was permissible under similar conditions heretofore, thus resulting in considerable savings. I believe most of the manufacturers today have an instrument of this type available.

Spun cable means extended life and elimination of ring cuts. A new type fuseless station protector offers some savings in the urban area at locations where the service drop feeds directly from a metallic sheath cable and the station ground can be secured from a water system.

Neoprene or nylon braid instrument cords offer at least 200 per cent longer life than cotton braid. Rural carrier is a possible solution for the customer requiring a private line service at a location in the country distant from the central office, or to obtain additional rural circuits where wire additions would exceed $1,000 a circuit.

There are other developments in the telephone art now in the process of perfection in the Bell Telephone Laboratories. I understand that they are presently working on a new type of self-suspended cable wherein the supporting messenger would be in the center of the core and the conductors laid up around the messenger. They are experimenting with a fiber glass ladder which is lighter, stronger and more durable than the present wood types which we have been using. They are experimenting with plastic duct which is lighter in weight, stronger and would have a longer life than the types we have been familiar with in the past.

Assuming that all of our surveys and engineering develop costs that can be supported by a good return on the investment as a result of traffic savings and rate increases, it is next important that we develop a timetable for the execution of the program, all geared to the date that the manufacturer has advised that he can have the equipment installed, tested and ready for the cut-over.

It is said that "a chain is no stronger than its weakest link." It is important, therefore, that this timetable or schedule by departmental activity be kept in every detail and that we attempt to anticipate everything that must be done prior to the conversion, how long it will take to do each item, when the item must be started in order to have it completed on schedule, and that this schedule or timetable be reviewed with regularity to see that the items are being taken care of.

For example, we would have to know exactly how many stations would have to be rewired and how many telephones in each ringing frequency would be required, assuming that we were using frequency ringing. We would have to evaluate how long it would take to perform the work at each station, exactly when the work would have to start based on the man-power available to have it completed just ahead of the cut-over, and the material for this work, including the instruments, would have to be ordered so that it arrived at the time it was needed in order to complete this portion of the work by the time planned.

In your plans for converting station equipment from magneto or common battery to automatic, it is necessary to decide early in your program what type of cut-over is desirable and eco-

nomical. The best of these plans provides for the minimum amount of work being done on the actual cut-over day. To accomplish this, you should arrange to have all your station equipment placed and ready for operation at cut-over date. If you are presently supplying service on a magneto basis, it will be necessary to have both magneto and dial telephones in place to effect an easy cut-over. There are several ways of accomplishing this.

Dial instruments may be placed on the subscriber's premises well in advance of cut-over and at a time when labor forces are available to do this work conveniently. For this reason, of the following methods, Method I is, by far, the most popular and at the same time, the most economical:

Method I

(a) Arrange to have your supplier make an advance shipment of the material and equipment necessary to furnish your ringing supply on a temporary basis until time of cut-over. *Remember that a power failure renders such equipment inactive* but does not restrict the originating of calls by the subscribers. If your central office requires the use of vibrating converters instead of static converters, you will require advance shipment of these converters, central office batteries and charger, together with sufficient mounting facilities. Close coordination with your supplier will be necessary to schedule the equipment when needed. The installation of this equipment probably can be handled by your own forces.

(b) Procure a five-frequency master locking key with a reversing cam key for each one of your existing positions. These keys can be mounted in the key pocket if space is available and, if not, it may be attached to the keyshelf end panel.

(c) Wire the five leads of the frequency ringing machine to your five-frequency master key. The distance separating the converter and present switchboard is not critical up to moderate amounts. One pair of wires per frequency from the converter to the key will be sufficient. Wire the controlled leads leaving this master key to the common "in-generator" supply of your present switchboard ringing keys. The operator may, by the use of the correct keys on this master key, select the desired frequency and side of line which can then be controlled further by the use of the cam key in the present ringing equipment. If the more preferable metallic ringing is to be employed, the use of the aforementioned reversing cam key can be dispensed with.

(d) Install the new dial station equipment at each subscriber's station, bridging it on the existing line wire and disconnect the ringer lead on the old magneto bell. Instructions must be given to the subscriber at this time, telling him that from then on his ringing will be on a selective basis and that the only time his bell (in the new dial telephone) will ring is when there is a call for him. Subscribers on any line so treated will, until conversion, use the old magneto telephone for signalling and talking.

Method II
(Does not require advance placing of ringing supply)

Install a condenser to insulate the present magneto equipment from the line. You may then install the automatic equipment, instructing the subscriber to use the magneto equipment until cut-over time and, thereafter, use the already placed dial equipment. This method may result in poor transmission due to an excessive number of instruments being bridged across the line.

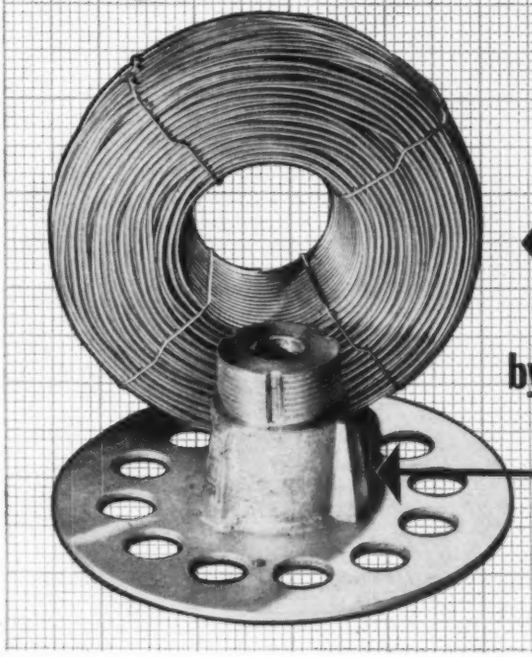
Method III
(Does not require advance placing of ringing supply)

Wire a simple double-throw knife switch to be thrown by the subscriber at the time of cut-over to automatic, which will disconnect the magneto equipment and connect the automatic equipment. The purchase of a switch of this type, however, usually amounts to approximately the same cost as the purchase or rental of ringing condensers.

Methods II and III do not permit testing of the ringing facilities of new automatic equipment and may result in service complaints immediately after cut-over.

Cut-over sheets must be developed so that the station installer, without loss of time, can handle the cut-over work in the sequence that it should be

Why the Hub is Tapered!

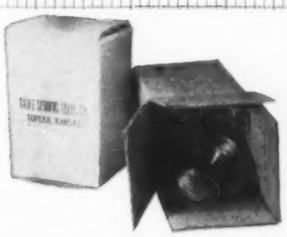


Lashing Wire Coiled to Fit Taper

Taper Formed by Easy-to-Modify Lugs

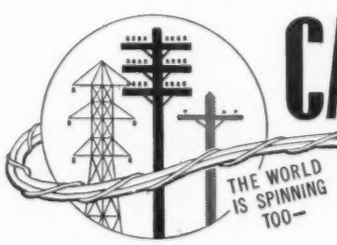
● The illustration shows how the hub of the Neale Spinner wire spool is tapered and how Neale lashing wire is coiled—so it will fit on this tapered hub *only the right way.* This design prevents reverse pay-out and back-lashing, and is your assurance of fool-proof operation.

Though not recommended, it is easy to modify lugs for wire coiled on straight hubs.



FOR BEST RESULTS ...use Neale lashing wire, coiled to fit the tapered hub. Every type and quality available.

See Your Jobber



CABLE SPINNING Equipment Company PHONE 2-7234

3100 TOPEKA AVE. TOPEKA, KANSAS

Speaking of "Telephone Numbers"...

Here are two "Yankee" Tool "numbers" that have become first choice of telephone linemen everywhere. Dependable tools for dependable service men.

No. 2101

"YANKEE" RATCHET BRACE

It's a time-saver with a smooth, easy ratchet action. Shifter will not move during drilling. Quick-centering ball-bearing chuck holds bits firmly. Ingenious assembly of sweep hand eliminates excessive play and binding. Practically unbreakable hard rubber handles.

No. 41

"YANKEE" PUSH DRILL

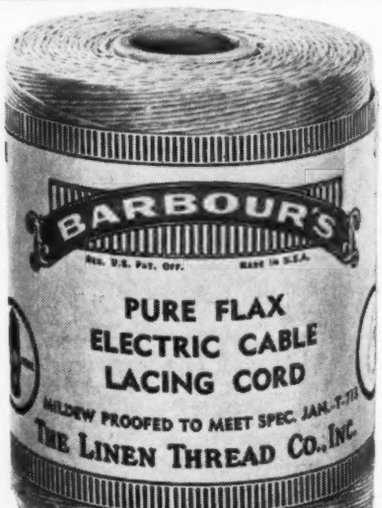
Another long-standing favorite with telephone men. "Yankee" chuck construction holds drill points so they cannot be pulled out when tool is in use. All exposed parts are chromium plated. Magazine handle holds 8 drill points, 1/16" to 11/64".

Write for free "Yankee" Tool Book. "Yankee" Tools, 209 W. Lehigh Ave. Phila., 33, Pa.

STANLEY®

"YANKEE"® TOOLS

A Division of The Stanley Works



TWO TOP QUALITY ELECTRIC LACING TWINES

FROM THE SAME SUPPLIER

THE LINEN THREAD CO., INC.

418 Grand Street, Paterson 1, N. J.

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handled to eliminate lost motion, back tracking and unnecessary trips back to the office. To prepare cut-over sheets, it is important to secure in advance number assignments for the new automatic equipment from the supplier. Everyone that has any part in the conversion must be fully briefed on his portion of the work. Extra time spent in planning and explaining methods and procedures before work is started will pay dividends through improved performance on the job.

I recall many years ago that I had a cable project in a small Illinois town involving relief starting at the central office and a reversal of the cable count. I asked the supervisor in charge if he could handle the preparation of the cut-over sheets, and I received an affirmative reply. Several weeks later, after the construction was completed and the cut-over was in progress, I happened to stop in this town enroute to an appointment in another location. Maintenance trucks were lined up in an alley at the rear of the central office and plant men were swarming in and out of the back door of the office like bees around a hive. Each outgoing man carried a small slip of paper that the wire chief had given him. Looking at one, I discovered it read, "Go to terminal 42 at the rear of Fatso's Bakery and cut Joe Doaks from old cable pair 42 to new cable pair 47 in new terminal 45. His telephone number will change from 47-J to 124-R."

Needless to say, I got no further on that trip and spent the rest of that day and far into the night preparing adequate cut-over sheets so that a man dispatched in the morning had his work for the day and the sequence clearly indicated in which that work was to be performed.

A few minutes planning will save hours in work time.

I think it is also important that after we have explained the duties and procedures to the workmen that we be sure that they understand and know exactly what is required of them. Sometimes procedures or techniques which may seem perfectly clear to us are not understood by the workmen. Sometimes we take for granted that they have knowledge which actually they do not possess. For example, I recall a situation some years ago where a supervisor, following receipt of some service complaints, had occasion to make a line check in an exchange using the usual voltmeter for leakage tests to ground and between conductors and a Wheatstone Bridge to determine excessive loop resistance and unbalance. Several of the lines tested indicated unbalance varying from 50 to several hundred

ohms; the supervisor left his portable bridge at the exchange with instructions to the plant man to eliminate the excessive unbalance.

Returning several weeks later, he asked the plant man if he had corrected the conditions previously called to his attention. "Most certainly," replied the plant man. A subsequent test by the supervisor revealed that the conditions previously noted were not changed. "What is the trouble?", asked the supervisor. "I find no improvement whatsoever in the lines I called to your attention." "Why," said the plant man, "if you don't believe me, ride out over them. I have every wire exactly even."

So you see, there we had a case where the supervisor had taken it for granted that the plant man understood how to use a Wheatstone Bridge, and I don't doubt that the plant man consumed many hours of valuable time in an attempt to even the wires on the lead in question believing that he was balancing the circuits.

Getting back to the dial conversion schedule and looking at one for the Corinth, N. Y., exchange, which is scheduled for conversion during the spring of 1955, under the Commercial section of the schedule, there are such items as: (1) Determine the method of listing and handling police, fire alarm and other emergency calls; (2) determine the method of handling Western Union calls; (3) review furniture requirements and order new equipment; (4) prepare instruction card for each station for operation during interim; (5) have paystation instruction cards prepared and printed; (6) determine type of dial card. And so on down the line including handling service orders and handling changes in the telephone directory, the revision of rates with the public service commission, the preparation of advertisements in the local papers, billing inserts to the customers, instructions on dialing, etc.

Similarly, the Traffic Department have their items numbering 1 to 16 which include: (1) Advise traffic employes of effect on their work caused by the automatic conversion; (2) preparation of temporary bulletin boards for use of the operators during the replacement of station apparatus; (3) coordinate operation of alarm send, busy override, alarm check, coinbox tone, etc. with the New York Telephone Co.; (4) coordinate toll operating procedure with the New York Telephone Co.; (5) check directory instructions, etc.

The engineering section of the schedule defines such items as: (1) Prepar-

for MICROWAVE...

for TV...

it's— pdc

MICROWAVE

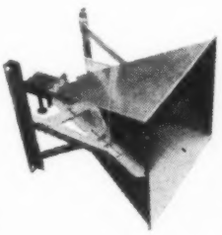
COAXIAL TRANSMISSION LINES

⅞" 50 OHM—1⅝" 50 OHM

Ideal for applications to 3000 mc, without regard to frequency. Furnished with RETMA flanges, which feature locating pins and anchor insulator connectors for positive concentricity between sections. Can be supplied with PDC "Air-tite" couplings for rapid, leak proof assembly in the field. Proved in use in many critical applications. More in use than all other types combined.

TOWERS

Prodelin all-aluminum guyed towers are available, in 10-foot increments, to a height of 200 feet. They can be raised or dismantled by 3 men in a half day, without special tools or footings. No wrenches, nuts or bolts required to erect towers.



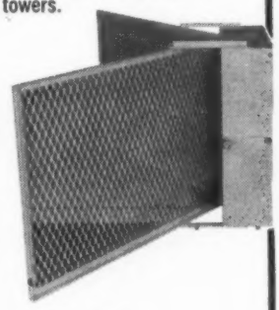
ANTENNAS

Cavity-Fed Corner Reflector ⟶

All-aluminum, high gain, from 890 to 2700 mcs. Ideal for short distances, as in local "side hops." Lightweight. Low wind resistance, facilitating pole mounting. Inexpensive. (See illustration right.)

⟵ 2000 MC. Horn

All-aluminum, 20 db antenna for 2000 mc microwave communication. Low cost. Replaces more expensive parabolic antennas for short-distance transmission. (See illustration left.)



Parabolic. High gain, center and offset fed, from 890 to 2700 mcs. Spun or mesh aluminum. Superior electrical and mechanical performance. Many features incorporated as a result of years of actual experience and user case histories.

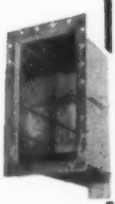
TV BROADCAST

COAXIAL TRANSMISSION LINES

51.5 and 50 ohm teflon and steatite insulated transmission lines and components provide very low attenuation, low VSWR, and flat impedance systems. Nominal 51.5 ohm lines are currently supplied in both teflon and steatite. Teflon lines are available with either RETMA flanges or PDC "Air-tite" couplings at no additional cost. 6⅛" teflon lines are supplied only with RETMA flanges; steatite insulated lines with RMA.

UHF-TV WAVEGUIDE

Prodelin is first choice in UHF-TV installations using waveguide. Prodelin pioneered in commercial TV waveguide proving exceedingly efficient over a long term of service in many installations. Special sexed flanges, which allow for expansion, permit rigid hanging direct to the tower members. This also eliminates the 24 bolts previously required and reduces installation time more than 50%.



UHF "TELEPLEXER"

The Prodelin "teleplexer" consists of a vestigial sideband filter and a diplexer. It combines the output of the aural and visual transmitters, rejecting and absorbing the unwanted portions of the signal. The resultant signal is fed to a single transmission line. The "teleplexer" is designed for inexpensive conversion to 50 KW operation.

Write for Fully Descriptive Catalog on all these Prodelin Products

Prodelin Inc — pdc

World's Finest Transmission Lines

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GENERAL MACHINE PRODUCTS COMPANY, INC.
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Aerial Tents
Cable Benders
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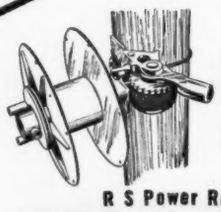
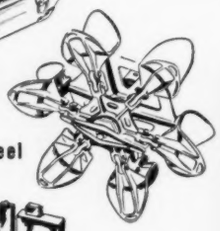
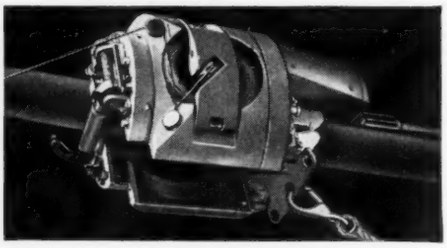
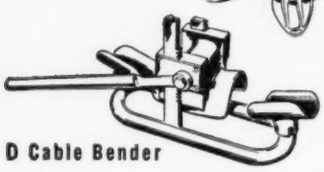
Coaxial Cable Tools
Lashing Wire Clamps and Grips
Portable & Power Reels

Pressure Testing Kit


R S Power Reel


C R Power Reel

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Distributed by Graybar

B, C, D & E Cable Lashers

Special Purpose Tools To Specifications
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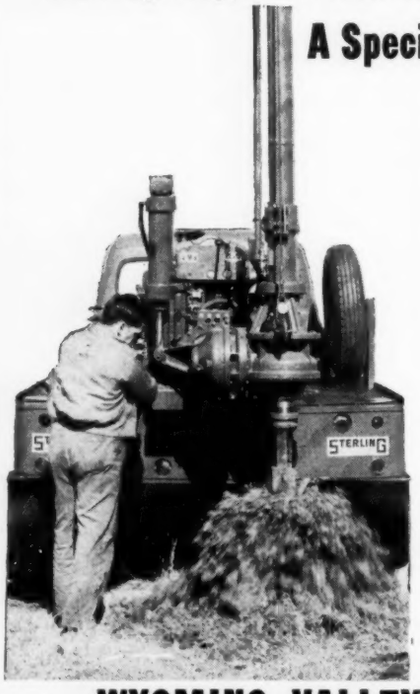
Over 250 various items of Line Construction Tools, Maintenance & Pressure-Testing Equipment in stock for immediate Shipment

SPECIALIZED COMMUNICATIONS EQUIPMENT SINCE 1918

GMPCO

A NEW EARTH BORING MACHINE PACKAGE
Including Body, Turn Table with Fore and Aft Feature at

A Special Low Cost of $5991.50



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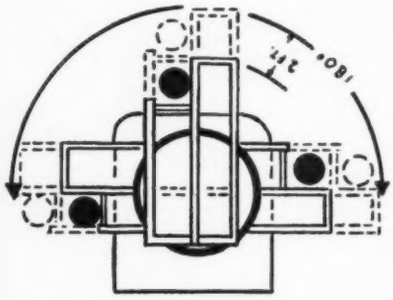
"ENTERPRISER" Hyd. Controlled Earth Boring Machine....$4617.00

Turntable Fore and Aft with Steel Body $975.00

Mounting digger on body, extra equipment and lighting including stabilizers $399.50

Customer will furnish truck or we will quote on proper size.



WYOMING VALLEY EQUIPMENT CO.
1089 Wyoming Avenue — Forty Fort (Wilkes-Barre), Pa.
Phone Kingston, Pa. — BUtler 7-3158

ing the estimate for the construction of the building; (2) having the building ready for the equipment; (3) preparing estimate for outside plant work and station apparatus; (4) determining that all material is on order for the conversion; (5) securing bids for the conduit work and awarding of the contract; (6) construction of conduit facilities; (7) release of the rewiring check sheets; (8) preparation of the list of dial assignments showing old and new numbers and showing subscribers' names; (9) release of the cut-over sheets; (10) making the transmission check on all toll circuits; (11) making cross-talk tests on the exchange cable; (12) coordinating the cut-over with the New York Telephone Co., etc.

In the equipment section of the schedule, we find such items as: (1) Preparing floor plans and detailed specifications for the central office equipment; (2) ordering central office equipment; (3) preparation of work estimate for central office equipment; (4) preparing and distributing operating features of the automatic office equipment to the operating departments; (5) delivery of the new main distributing frame and installation, installing and testing the new central office ground, which incidentally should be five ohms or less; (6) delivery, installation and testing of new central office equipment, etc.

In the section for the outside plant maintenance forces, we have the responsibility for ordering the dial station apparatus; its delivery; ordering other material required for the station replacements; delivery of other material; providing an electric iron for the new main frame; providing a fire extinguisher for the new central office; checking of drops and inside wiring and replacement, if necessary; checking the station protectors and grounds; installing the dial station apparatus and making insulation breakdown tests; preparing and keeping corrected daily, line cards and cable records, etc.

In the construction section of the schedule, we have 10 items which include such things as completion of the line construction work on the outside plant; terminating the entrance cable; complete trimming of all lines; complete pre-conversion splicing; Megger all vacant pairs and aid the transmission engineer in crosstalk tests; patrol all lines just prior to cutover to check tree clearances, broken insulators, etc.

In each instance and for all items on the forms comprising this schedule (see boldface boxes), there are completion due dates assigned to each item. There is a blank column for entry of the date started and there are a number of

blank columns to record the per cent completed on different dates as the schedule is reviewed from time to time up to the date of cutover.

(Following are the department designations used for the conversion schedule and the person responsible for the work listed to be done under each department. See bold face boxes):

Section	Responsibility of
C	General Commercial Superintendent
T	General Traffic Superintendent
E	General Plant Engineer
CO	General Equipment Supervisor
M	District Maintenance Supervisor
P	District Construction Supervisor

A subject of this type is so large that obviously we here can only highlight the various items to consider, and as a result, I have only outlined a broad, general course of action.

NEW DEVICES

Continued from page 38

posed to the elements in such a manner that it will promote decay. The use of this tool is recommended to pressure treat each hole bored in the field, before the bolt is inserted, so that the inner area is adequately protected.

This treating device consists of a pump which is screwed into one end of the hole and a plug for screwing into the opposite end. The selected preservative is poured into the cup until both the hole and the cup are filled. The pump is then operated by pulling back on the handle. When the handle is released, the spring inside the barrel pulls the plunger forward, exerting pressure on the preservative and forcing it into the wood wells. At the farthest outward position of the handle, the spring exerts a pressure equivalent to 120 pounds per square inch. Additional pressure applied to the handle will increase the liquid pressure, and for this reason a safety valve is provided to prevent damage to the timber.

This tool is available in two different types. One type treats holes for $\frac{5}{8}$, $\frac{11}{16}$, $\frac{3}{4}$, and $\frac{13}{16}$-inch bolts. The other type will accommodate all hole sizes from $\frac{1}{2}$ to 1-inch, inclusive.

2.07. *Portable Air Compressors.* The use of compressed air in the telephone industry has increased down through the years until now it is considered a necessity in many exchanges. Compressed air is used to operate various types of hand tools, for paint spraying, cable testing, duct rodding, etc. Unfortunately, most air compressors are large, heavy and cumbersome and, therefore, are not suited to the easy moving required in the telephone ex-

SELF-BONDING
(polyethylene based)

INSULATING TAPE

- Quick and easy to apply
  —no sticky adhesive
  —no right or wrong side
- Fuses into solid mass
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- Insures permanent moisture seal
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- Remains flexible, even at extreme low temperatures
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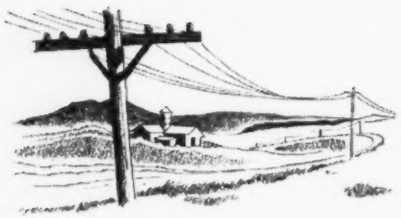
Detailed method for plastic cable splicing available on request.

BI-SEAL is available through your telephone supply distributor.
Canadian Representative: Drummond & Company, Ltd., Montreal, Quebec.

APPLIES FAST • STAYS FAST BI-SEAL **BISHOP** MANUFACTURING CORPORATION
12 CANFIELD ROAD, CEDAR GROVE, NEW JERSEY

STEADY



You're assured of no rocking or wobbling on pins with Armstrong Glass Insulators. Every one is hand gauged as it comes off the production line for accuracy of threads and pinhole diameter. For details, write Armstrong Cork Co., Glass and Closure Division, 295 Fifth Avenue, New York 16, N. Y.

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change if they are to be properly utilized.

A new type small compressor mounted on rubber tired wheels and equipped with a convenient handle makes it readily adaptable to telephone use. The handle may be removed and it may be easily transported in a passenger car.

These compressors may be gas engine or electric operated. The 60-pound outfit may be powered by a 1 hp. electric motor or a 1 hp. gasoline engine. The 100 pound outfit is powered by 1 hp. electric motor or a ½ hp. gasoline engine.

The adjustable release valve may be set to deliver the pressure you need for best performance of the wide variety of tools and for jobs requiring steady pressure up to 100 pounds. An air tank is furnished to provide steady pressure. This feature eliminates air pulsation and collects moisture that otherwise would condense in the air hose. This tank has a convenient drain valve.

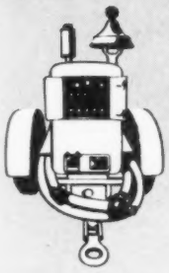
2.08. *Solderless Connections.* From almost the beginning of the telephone industry we were taught that it was a mortal sin to leave any connection where a wire was wrapped around a terminal unsoldered. It now appears that we must revise our thinking radically for the solderless connection has proven its worth and is definitely here to stay. In this connection, it may be well to mention how this change in thinking, as to the proper method of making connections, has come about.

Great progress has been made during the past three decades in the design and manufacture of electronic components and assemblies, including such important ones as communication, radar, television, and electronic computing devices. During this period of product development and the streamlining of manufacturing methods, there has been little change in the basic method used for making electrical connections. Hand wrapping wires to terminals, and soldering, continues to be the method in general use. Now an entirely new technique has been developed in the wire-wrap method which successfully and completely eliminates the need for soldering.

This new method not only eliminates all need for solder, but, since it is made with a power tool, less time is required than for hand wrapping. The resulting economy in costs provides ample incentive for substitution of the new method wherever it is applicable.

Close examination indicates that under the tension at which wire-wrap connections are made, there is a high shearing force at each of the four cor-

S & G MOBILE POWER UNIT



The S & G mobile power units are totally enclosed—can be operated without removing the side panels.

For use by telephone cable splicing crews, for lighting, operating solder pots, solder irons and electric blowers for ventilating manholes. Equipped with diaphragm pump to remove seepage and drain back. Air Compressor to put cables under pressure when making cut-overs or repairs. The units are light, easy to handle, and very quiet in operation. Can be furnished less compressor and pump.

for further information write... or phone RAymond 3142

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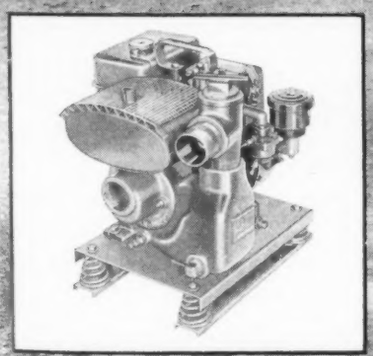
GORMAN-RUPP PUMPS

Designed for Telephone Companies

QUIET — STURDY — EFFICIENT

Especially for **quiet** zones — ideal for residential areas. Equipped with quiet accessories, including muffler and hand throttle.

ASK FOR TELEPHONE PUMP BULLETIN



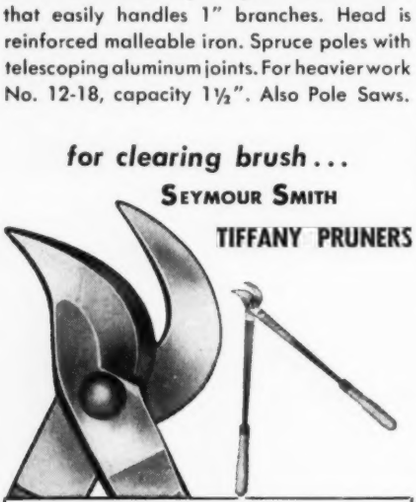
THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

Illustrated above is No. 11 Tree Pruner with center cut action by tempered steel blade that easily handles 1" branches. Head is reinforced malleable iron. Spruce poles with telescoping aluminum joints. For heavier work No. 12-18, capacity 1½". Also Pole Saws.

for clearing brush . . .

SEYMOUR SMITH

TIFFANY PRUNERS



Hand forged throughout. Fast and easy double cut action with thin blades shaped to "draw in." Improved bolt and nut joint, through handle and riveted grip fastening.

FAST-CUTTING SAWS

Blades of Swedish charcoal steel. Large, deep teeth with heavy set to prevent binding. Hand and Pole models for all work up to chain sawing.

Quality Tools
SEYMOUR SMITH
Since 1850

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Oakville, Conn.

ners of the rectangular terminal which scrapes off surface films from both wire and terminal and produces a clean, bare, metal-to-metal contact.

Laboratory investigations indicate that extremely high pressures are developed between wire and terminal by the new wire-wrap method. The initial pressure in the center of the contact area may be as high as 100,000 p.s.i. When 24-gauge wire is wrapped, for example, the pressure is so great that it produces a contact area approximately 25 square mils at each corner of the rectangular terminal, or 100 mils per turn.

The high pressure developed during the wrapping process drops almost instantly after the wrapping is completed because of cold flow (or creep) of copper. A study of copper's elongation or creep characteristics indicates that after cold flow has relieved the contact pressure to some value greater than 4,000 p.s.i., there is no further elongation, the metal becomes stabilized and remains constant for the life of the contact.

Laboratory tests have also been made to determine the effect on electrical characteristics of wire-wrap connections which result from exposure to severe temperature changes, humidity, corrosive atmospheres, and vibration. Studies indicate that the thickness of tarnish film on bare copper wire and bare terminals of brass, copper, or nickel silver when subjected to such atmospheric conditions as would apply under indoor exposure for a period of 40 years would not be as much as one mil.

The wire-wrap tool is, basically, a metal rod containing two axial holes; a small hole for receiving the skinned portion of the wires; and a larger hole for receiving the terminal. This metal rod is known as the wrapping bit. The skinned wire is placed in the wrapping bit, the bit placed on the terminal and rotated, forming a tightly wrapped coil of wire around the terminal.

The wire-wrap tool may be obtained equipped with either an electric or an air-motor driven wrapping bit which turns within a sleeve. The sleeve contains a wire anchoring notch on each side which holds the insulated portion of the wire preventing it from wrapping around the terminal. The length of the skinned wire determines the number of turns of wire that will result on the terminal. For example, when using 24-gauge wire, approximately ¼ inch bare wire is required for each turn. Since six turns are required for a 24-gauge solderless connection, the skinned longth should be 1½ inches. If used for a wrap and solder connection, as few as two or three turns may be sufficient.

AUTOMATIC POWER PLANT

Concluded from page 48

interruption and while discharging its voltage will be lowered. Charging will then be necessary and while charging the voltage will be raised. Therefore, to complete the automatic power plant, automatic control of the end cells and the counter cells is necessary.

End cells (also called emergency cells) are of the same type and size as the regular cells and are cut into the discharge circuit one at a time as the voltage of the battery goes down. The end cells are kept charged by a small trickle charger, usually of the copper-oxide type.

Counter cells generate a voltage which always opposes the current flowing through them. As the voltage goes up the counter cells are cut into the discharge circuit one at a time.

Another important function of the automatic power plant is to operate visual and audible alarms if anything goes wrong. These alarms warn of high voltage, low voltage, rectifier, or generator not operating, etc.

What will be the next improvement? The day may well come when a telephone plant will be powered by a solar battery mounted on the roof of the exchange building. There will then be no power bills and very little maintenance.

We have several times mentioned the various troubles to which a storage battery is subject but we have not yet discussed ways of dealing with these troubles should they occur. This will be covered in a coming article.

V V

Western L&T Directors Vote $4,000,000 Financing Plan

Directors of the Western Light & Telephone Co., Great Bend, Kan., authorized issuance and sale of 3 million dollars in 30-year first mortgage bonds and sale of about 40,000 shares of additional common stock, it was reported on Nov. 24.

The financing is expected in January, according to Arthur L. Mullergren, chairman. Private placement or public offering of the bonds will depend on market conditions, he added. The common stock probably will be offered to shareholders on the basis of one share for each 10 held at a price still to be set, Mr. Mullergren said.

Proceeds of about 4 million dollars will finance the company's 1955 construction program.

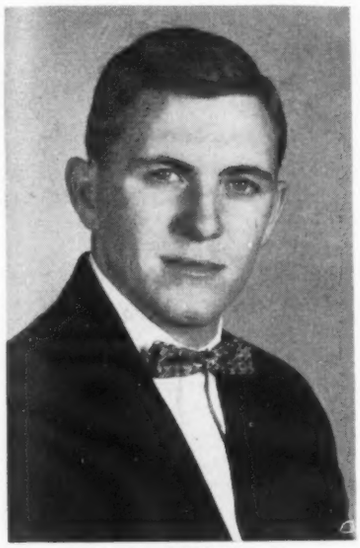
V V

>> It has been said that life lived just to satisfy yourself never satisfies anyone.

Two New Salesmen Represent Leich in Southeast

Leslie H. Warner, president of Leich Sales Corp., announces the appointment of two new salesmen by Leich. Jac N. Johnson will represent Leich in Georgia and Florida, and James C. Pardue's territory will be the states of Virginia and North Carolina.

Mr. Johnson joined Leich from the Inter County Telephone & Telegraph



J. N. JOHNSON

Co., Ft. Myers, Fla., where he was employed in the plant department. He grew up in the telephone industry and started out as a construction helper during summer vacations. He had also had experience in commercial work.

Mr. Johnson plans to live in Lake City, Fla.

Mr. Pardue went with Leich from the Central Telephone Co. where he

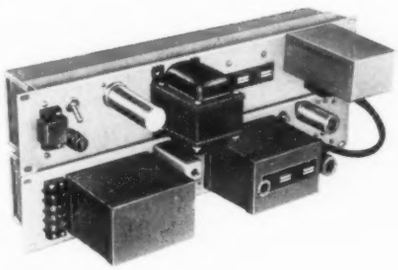
J. C. PARDUE

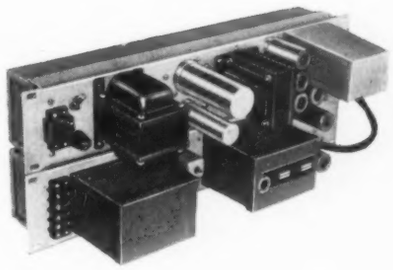
worked for the last six years. He had experience in both plant and commercial departments and just prior to joining Leich, Mr. Pardue was commercial supervisor for 20 exchanges in North Carolina.

BUCKEYE CAN SHOW YOU HOW. . .

YOU CAN ADD NEW SUBSCRIBERS TO EXISTING LINES AT LOW COST

with **North's New Telephone Carrier**





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. . . Gives you these advantages

Provide service for waiting-list customers adjacent to lines now filled to capacity.

Reach potential customers beyond the end of present lines, without the cost of new construction to that point.

Provide private, two-party or four-party lines not now available, with resulting improvement in rate earnings.

Free physical circuits for paystations or other special revenue telephone service now blocked by lack of capacity.

Meet demands for special temporary service, such as resorts, construction camps, etc., where carrier can be moved to meet changing requirements.

Offer improved service to customers now on overcrowded lines.

Technically explained and illustrated in BULLETIN C-541

FOR FURTHER INFORMATION WRITE FOR BULLETIN C-541

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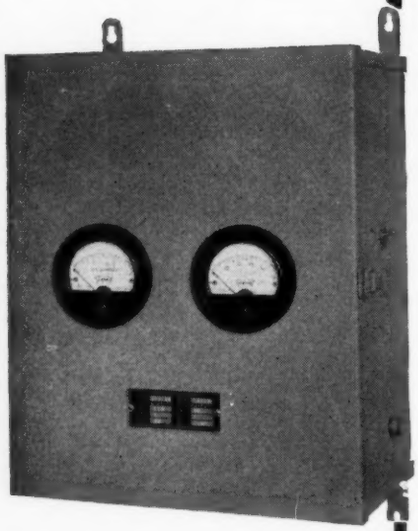
of Service!



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In sizes and capacities to meet every telephone power requirement.

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Mr. Pardue was educated at Lake Forest College and during World War II he spent two years aboard a mine sweeper in the South Atlantic.

He will live in Mount Airy, N. C.

V V

Cook Electric Company Opens Washington, D. C. Office

Charles H. Brunell, sales manager vice president of Cook Electric Co., Chicago 14, Ill., announces the opening of new offices at Room 805 Continental Building, 1012 Fourteenth St. N.W.,

Col. W. M. TALBOT

Washington 5, D. C. This office will be headed by Col. William M. Talbot (USAF, Ret.).

Col. Talbot joined Cook Electric Co. from the Federal Civil Defense Administration where for the last three years he headed the warning and communications division. Colonel Talbot will represent the Diaphlex, MagniLastic, Wirecom, Plymold, Airmod, and electronic systems divisions of the company.

V V

Philco Moves West Coast Office To New Building in Los Angeles

Philco Corp., government and industrial division, announces that its western regional headquarters have been moved to new and larger offices in Los Angeles.

James D. McLean, general sales manager of the division, said the transfer from Beverly Hills to Los Angeles (10589 Santa Monica Blvd.) was made necessary by the rapid growth of the corporation's activities for both government and industry on the West Coast.

All regional Philco activities relating to military communications, radar and guided missiles as well as television broadcast, microwave communications and industrial field engineering services will be centered in the new building, erected especially for Philco.

The Philco organization there will continue to be headed by Marshall A. Williams, regional manager, who is well-known in aircraft, television and communications circles in the West.

V V

C&D Batteries Opens New Plant In Conshohocken, Pa.

C&D Batteries, Inc., Conshohocken, Pa., held a two-day open house on Nov. 29 and 30 to mark the formal opening of their new plant.

On Nov. 29, 1953, C&D was struck by a disastrous fire, which destroyed more than 75 per cent of their plant. By hard work, and with the help of their suppliers and local business people, C&D states, it was back in limited production in three days and full production by Christmas.

The new plant has been greatly enlarged and is of fireproof construction. The newest processes for the manufacture of storage batteries have been put into operation, the company reports. In addition, laboratory and cafeteria facilities have been enlarged.

V V

Ohio Bell Negotiating to Buy Air Base Telephone Systems

Negotiations are under way between the federal government and the Ohio Bell Telephone Co. to sell the government-owned telephone systems, at Wright Wright-Patterson and Gentile Air Force bases to Ohio Bell, the Dayton (O.) *Daily News* learned on Nov. 19.

Spokesmen for both Air Materiel Command headquarters in Dayton and for Ohio Bell confirmed that the transaction is being considered. However, detailed information on the proposal was not made available.

It was learned that Ohio Bell estimated the value of the communications systems on the bases about three weeks ago. That estimate was not made public on Nov. 19 but it was said this formed a part of the company's proposal to the government.

V V

"It is not properly a federal responsibility to try to supply all the power needs of our people. The federal government should no more attempt to do so than it should assume responsibility for supplying all their drinking water, their food, their housing and their transportation." — PRESIDENT EISENHOWER.

TELEPHONY'S SAFETY BULLETIN

Concluded from page 25

(3) Get out of the car and walk around for awhile. Check the tires, clean the wind-shield, do anything that will serve as a change of pace.

(4) When you start out again travel at a reduced speed until sure your motion perception is back to normal.

We cannot present a formula of exactly when a change in your motion perception may occur. We doubt if anyone can. However, we can strongly urge that every driver give some thought to this important element of safe driving.

This new concept of how to maintain a high level of safety while driving along the highway may mean your own safety and that of others. It further emphasizes the true meaning of the slogan:

YOU HAVE TIME FOR SAFETY

V V

>> Shortly after World War II, Hanson W. Baldwin, military analyst, wrote that "if any one element can be said to have decided this war, it was American industry; this writer feels the war would have been lost had that industry failed in the tremendous demands put upon it. . . ." In Mr. Baldwin's opinion that was the major lesson of the war which Americans should never forget.

American industry today, including the telephone industry, is living proof that there is no such thing as stagnation in the inventiveness and productive capacity of free men. At present, half the nation's employment can be traced directly to the research laboratory.

MEASURE DISTANCE
as fast as you can walk
with *Rolatape*

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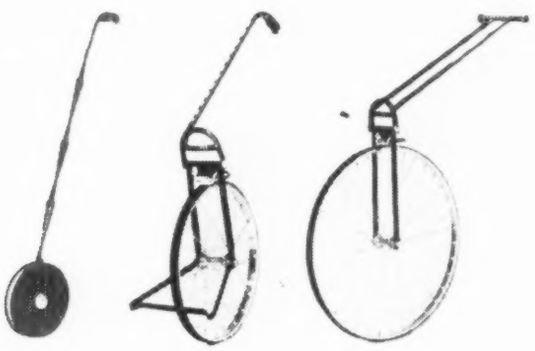
One man operation cuts measuring time
for pole and anchor locations
plant conduit and pole line layouts.
Lightweight, durable construction, long wearing.
All models fold compactly for carrying.



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Electricity . . .

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The communications worker who needs reliable, quick knowledge of fundamentals of electrical engineering has in this book all the explanations, illustrations, and applications of electricity he needs in his job. *The explanations and illustrations are taken from the communication field itself*—from telegraphy, telephony, radio and television.

THE ELECTRICAL FUNDAMENTALS of COMMUNICATION

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531 pages,
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WRITTEN expressly for radio men, telegraphers, telephony engineers, this book gives fundamentals of electrical engineering accurately, simply, from the point of view of the communication industry. It gives you fundamentals of electronics . . . explains what you need to know about direct current, conductors, resistors, and insulators; discusses such topics as the magnetic field, sources of electric energy, induction, motor and generator action, magnetic hysteresis, eddy currents, and many others. You will find sound, basic information that will help you know and understand electricity.

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NEW Model 45 Acousti-Booth — spacesaving configuration provides amazing acoustical performance.

50% Reduction in loudness of noise — 14 db attenuation — provides full-length Booth performance.

New triangular configuration permits 7 spacesaving multiple Booth arrangements.

All steel, doorless construction — silver gray hammered finish — easy installation — no maintenance.

WRITE for Bulletin A-131 for details, including auxiliary floor stand, light fixture, and brackets.

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light fixture extra

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35½" wide—32" deep—36" high.

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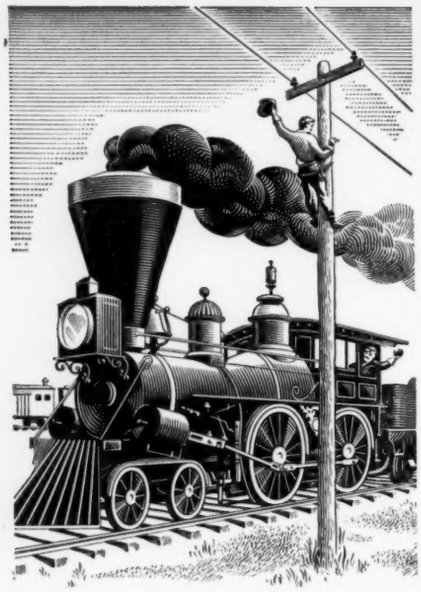

"Faster Freight"

In 1851, Erie Railroad became the first railroad to use telegraphic communications in dispatching trains. This method eliminated many hours of delay at passing points in the single track railroading of that day. Its success led to adoption of the telephone system for dispatching trains now in general railroad practice.

It was in this same era that the first Hemingray Glass insulators were made. Through constant research and development they have kept pace with the communication industries of the world.

There is an insulator design suitable for every communication pole-line requirement. Most jobbers carry complete stocks. Write for a free descriptive catalog. Kimble Glass Company, subsidiary of Owens-Illinois

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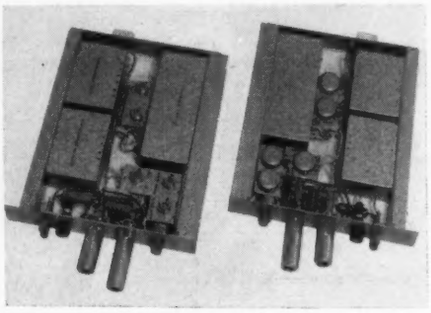
GENERAL OFFICES · TOLEDO 1, OHIO

news on new PRODUCTS

NEGATIVE IMPEDANCE REPEATER — A negative impedance repeater of the series type is now available, Kellogg Switchboard & Supply Co. announces. It is called the Kellogg Z-11 voice frequency repeater.

Shown for the first time at the recent United States Independent Telephone Association Convention, the Z-11



is designed to improve transmission on new or existing facilities at a minimum cost. According to the company, its low initial cost, as well as operating cost, makes it an economical addition to existing facilities, and when included in new construction, it permits smaller-sized cable to be used without loss of transmission efficiency.

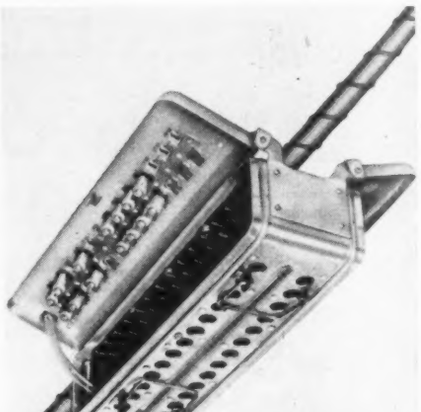
When the Z-11 is inserted in a telephone line, the effect is to cancel a portion of the positive impedance inherent in the line. This permits delivery of a higher signal level at the end of the line for a given signal input.

The Kellogg Z-11 voice frequency repeater is provided with adjustable controls for varying repeater gain and equalization. These controls facilitate the adjustment of repeater gain to satisfy the requirements of a particular application and also simplify the installation of the repeater by allowing greater latitude in adjustment of the impedance network, the company states.

The gain of the Kellogg Z-11 voice frequency repeater depends upon the extent to which the negative impedance generated by the repeater stimulates the impedance of the lines to which it is connected. One of the elements restricting gain of the repeater is the presence of reflections on the line due to impedance irregularities. Under optimum conditions the gain of the repeater may be as high as 10 db but never more than one half of the loss of the circuit in which it is connected. Request NP338.

• • •

STRAND-MOUNTED CABLE TERMINAL—Cook Electric Co., Wirecom division, has announced a new 26-pair Stranterm. This is a strand-mounted cable terminal which enables the installer to work close to the pole and features the embossed Minigap snap-in sockets, spring bronze ground strip



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Please have the manufacturer send me without obligation the literature indicated by the following numbers:

NP338_____; NP339_____; NP340_____; NP341_____;
NP342_____; NP343_____; NP344_____; NP345_____;
NP346_____.

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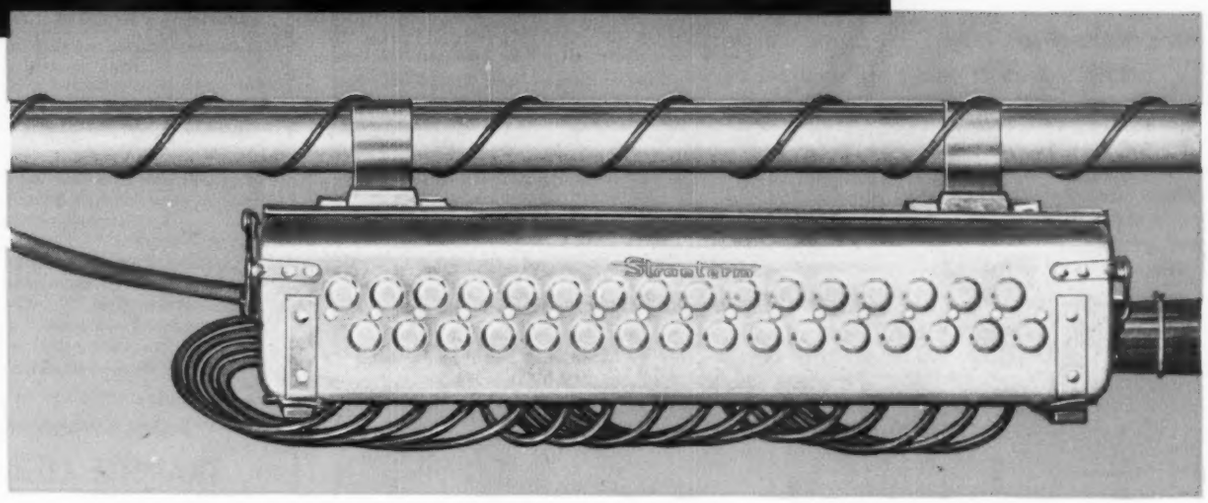
12/4/54

Stranterm

The only cable terminal with "PUSH BUTTON" PROTECTION*



Stranterm is also the only cable terminal which is supplied with either plastic or lead sheathed cable stubs.

All terminals are supplied with 3½ foot, 24 gauge cable stubs, which are soldered to heavy Everdur studs imbedded in a special unsaturated Polyester thermal setting plastic with fibre-glass filler, which provides indestructible, moisture-proof, gas tight potting of the terminal core.

Additional flexibility is provided in that the 11 and 16 pair cable stub and core are interchangeable in the standard terminal housing. Left and right hand cable entrance to the terminal box is also possible. These alternate arrangements are accomplished by the removal and reinserting of one screw.

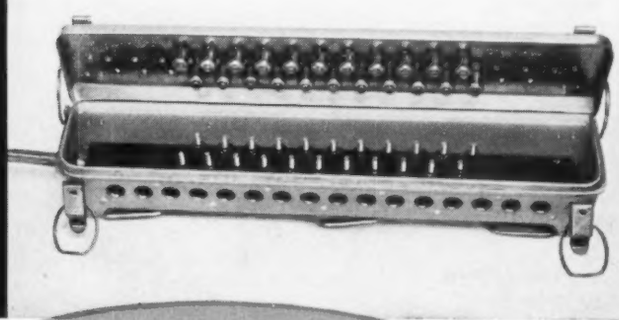
Drop wires are dressed and supported by means of three heavy stainless steel wire rings.

The quick opening cover lock and weatherproof cover design, coupled with the embossed Minigap snap-in sockets, spring bronze ground strip, and the neoprene self adhering drop wire entrance seal, evidence the result of Cook Research and Development as applied to telephone apparatus.

Stranterm also features an ingenious bell shaped cable nozzle which eliminates cable breakage due to excessive right angle bends.

We suggest that you order a sample Stranterm today and investigate the economies and improvements now made possible in your outside plant construction.

*The Stranterm is the only Strand Mounted Terminal which permits the installer to apply protection to the pairs requiring dischargers, or to install the same terminal unprotected as determined by the outside plant engineers.



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ACTUAL SIZE

COOK ELECTRIC Company
Since 1907

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pulls 1000 lb.

WEIGHS BUT 9½

Coffing Mighty-Midget Puller

The Coffing Mighty-Midget Puller hangs lightly on a tool belt . . . is always ready to provide full half ton of lift or pull — anywhere. For safety, the Mighty-Midget is tested at 50 percent overload. For added convenience, handle may be used either as a lever or high-speed crank.

For more information on this light, powerful Mighty-Midget, write for bulletin TMP.

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Quik-Lift Electric Hoists • Hoist-Alls • Safety-Pull Ratchet Lever Hoists • Mighty-Midget Pullers
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2-Way "Hex" Shank fits both Bit Brace and Electric Drill Chucks

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"HEX" SHANK
WOOD BITS

Use new Irwin Two-Way "Hex" Shank wood bits in Bit Brace. Remove and use in Electric Drill. "Hex" Shank fits both — perfectly! No wobble, no runoff. Speed up work on the job. Reduce replacement stock and handling by 50%. Sizes 4/16" to 17/16". Call your mill supply distributor, or hardware wholesaler for details and prices. Irwin — Wilmington, Ohio.

IRWIN HEX SHANK WOOD BITS

and neoprene self-adhering drop-wire entrance seal.

The terminal housing is of heavy gauge metal with a weatherproof, grounded, hinged cover with quick-opening lock and a hold-open catch.

All terminals are supplied with 3½-foot, 24 gauge lead or plastic cable stubs which are soldered to heavy studs imbedded in a special unsaturated Polyester thermal-setting plastic. Request NP339.

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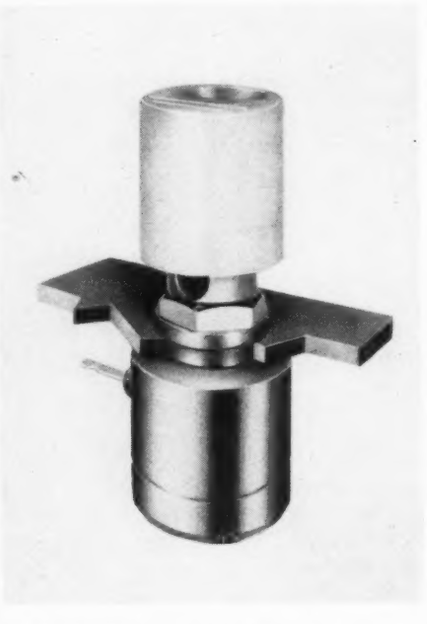
PROTECTOR BINDING POST—The Cook company also has announced that a U. S. Letter Patent No. 2,688,105 has



been granted to W. C. Hasselhorn, assignor to Cook Electric Co., covering the invention of a protector binding post.

This device provides lightning, high voltage and power cross protection on incoming lines to portable field telephone or test equipment with minimum space required for the protection feature, the company says. Replacement discharger elements, which are similar to the Minigap units, permit easy replacement and low cost maintenance. The discharger is grounded to the metal panel face and no ground strip or ground wires are required.

The 'Gator post is equipped with stellite jaws which increase their grip as increased tension is applied to the terminated wire. This binding post features a welded assembly, is self clearing, and the molded nylon cap prevents accidental grounding or short circuiting, according to the company. Request NP340.

• • •

LINEMAN'S PLIER—Mathias Klein & Sons now offers a new lineman's plier designed especially for clean and easy

Reduce installation costs in underground cable systems

Transite* Ducts speed installation. Lightweight, long lengths are easy to assemble; save time and labor.

Transite Ducts are adaptable. Readily cut and tapered in the field. Full line of fittings simplifies directional changes.

Transite Ducts ease cable pulling. Smooth bore reduces friction and abrasion . . . permits easy insertion or removal of cables.

Transite Duct installations are permanent because they are immune to rust, rot and electrolysis . . . resist corrosion and withstand all normal soil stresses.

For the complete story, write Johns-Manville, Box 60, New York 16, N. Y.

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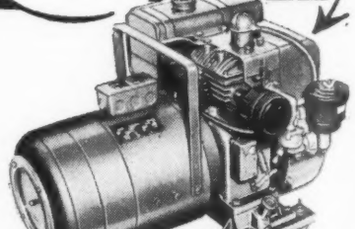
TRANSITE CONDUIT
for use exposed and underground without concrete encasement

Wherever you are the job is easily done with Katolight Portable POWER

60 cycles A.C.



SPEEDS UP WORK . . . CUTS COSTS!

Construction or maintenance is made simpler, faster and cheaper with a New Katolight Portable Power Plant. Operates saws, drills, hammers, soldering irons and other portable electrical tools and equipment.

Gasoline models from 350 Watt to 50 K.W. DC models 500 Watt through 15 K.W. in standard voltages for continuous or stand-by service. Also Multi-Frequency Ringing Power equipment.

CHAIN TREE SAWS

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POWER TOOLS

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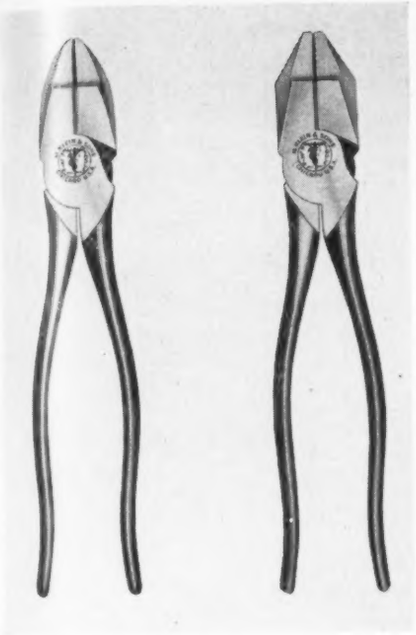

cutting of insulated and hard drawn bare wire. The company says that high leverage is provided without extra hinging, thereby eliminating the need for widespread width of the handles. This new tool also serves as a regular side-cutting plier.

The plier measures approximately 9 inches over-all and opens to accommodate No. 2 weatherproof hand-drawn solid copper wire. It will also cut A.C.S.R.

Like other Klein pliers, the high leverage lineman's plier is forged from high-grade tool steel, individually fitted, tempered, adjusted and tested, states the company. Available in either regular or N.E. (streamlined) patterns. Refer to No. 213-9 for standard plier. Refer to No. 213-9NE for plier with streamlined head. Request NP341.

• • •

RATCHET LEVER HOIST—There's an interesting story behind the design, development and testing of some of the tools used in the telephone industry. Such a story is that behind the new Super Power hoist now offered by Coffing Hoist Co.

The company was confronted with the problem of designing and building a ratchet lever hoist to fit a special U. S. Army application. Physical requirements as to efficiency, portability, serviceability and safety were so rigid they eliminated every hoist then on the market, according to the company.

The "Procurement Description" required the hoist to be of 2½-ton capacity when used with a single chain, but should be so constructed that the chain could be easily passed through the load hook and dead-ended to the

TAKE A BIG STEP TOWARD SAFETY WITH DUO-SAFETY LADDERS

... CUSTOM DESIGNED FOR TELEPHONE MAINTENANCE WORK!

Here's one fine example of the many Duo-Safety ladders ideal for telephone maintenance work.

Type D — a truly great extension ladder built in strict accordance with safety regulations. Rungs are second growth hickory, reinforced with steel rods and equipped with special automatic locks and Duo-Safety's famous Safety Shoes. Made with either straight or parallel side rails, Type D is available in one, two or three sections — in a large variety of sizes. Write for free catalog on all Duo-Safety ladders.

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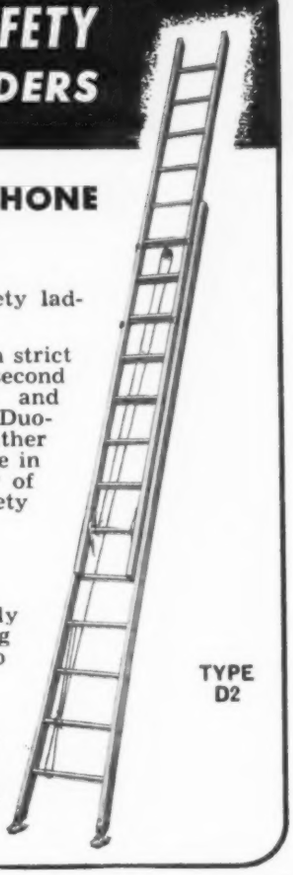
Duo-Safety ladders will be shipped immediately upon receipt of order! A planned stock-piling program assures really fast action — there's no delay the Duo-Safety way!



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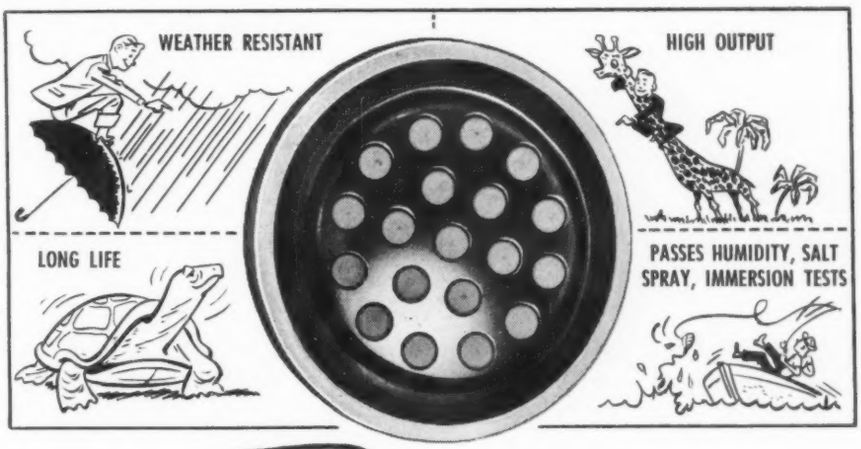

Roanwell

CARBON MICROPHONE ELEMENT MODEL RF-1
STYLE No. 0037

Completely sealed with chemically inert materials, against all outside contamination; results in a minimum loss in output after extensive usage ...Weather resistant; made to meet or exceed usual government specifications regarding humidity, salt spray and immersion ... Electrically and mechanically interchangeable with all F-1 type transmitters.

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hoist frame, converting it to a double-chain, 5-ton capacity unit. Thus, even as a 2½-ton model, the hoist frame, hooks and other load-holding parts had to be designed to hold 10,000 pounds with an adequate margin of safety. The complete unit with a 6-foot double-chain lift, was not to weigh more than 60 pounds.

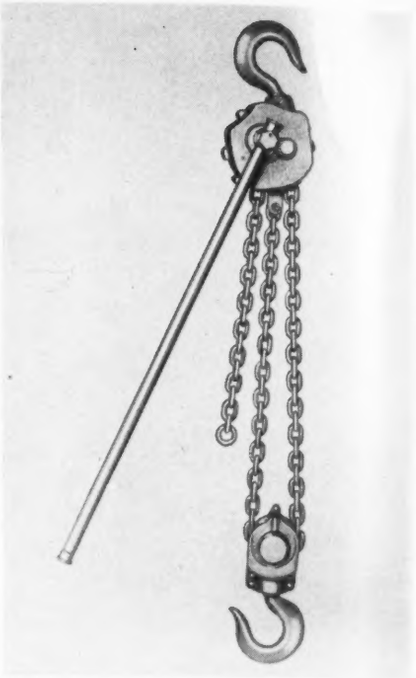
The Procurement Description further specified that the handle would bend when attempt was made to lift a load 100 per cent above rated capacity, but that such bending should not occur at less than 70 per cent overload.

The new hoist was subjected to and passed the 100 per cent overload test.

During the rated capacity test, the pounds of handle pull required to lift the load was measured and efficiency of the hoist calculated. Hoists showing less than 65 per cent efficiency were rejected.

Sample hooks had to lift a load of 30,000 pounds without failure. They were further tested by the drop test—probably one of the most efficient methods of hoist torture yet devised, the company relates.

The purpose of the drop test was to determine the ability of the chain, hooks, hoist frame, and other load-holding parts to withstand impact. To do this, a load of 10,000 pounds was dropped from heights progressing from one through 4 inches in one-inch increments in such manner that the falling load would be caught and held by the hoist. Each hoist tested had to stand the cumulative punishment of these drops without failure. The 4-inch drop is said to produce a shock load in excess of 40,000 pounds.



Coffing engineers proved that such a hoist could be built. To achieve the necessary compactness, strength and efficiency, a completely new principle of ratchets and levers had to be designed. This new hoist is called the Super-Power.

For the past two years Coffing has built and turned over its entire production of several thousand Super Power hoists to the Army. During this time it has passed all the required drop and overload tests plus a few that the company itself added.

To meet other requirements, the Super Power was built compact enough to be carried easily by one man and can be disassembled in the field with ordinary tools. The new patented mechanism offers an efficiency of 75 per cent. In addition, the company says, the Super Power is the only ratchet hoist with a grease-sealed mechanism which keeps dirt and grit out while it seals grease in. It can be refilled by removing a plug.

The Coffing Super Power is now available to civilian users for the first time since its development. Complete specifications and prices are available. Request NP342.

Plastic Cable

by GENERAL CABLE

Before you choose a plastic cable, make sure you consider *General Cable's* thermoplastic. Its tough outer jacket offers resistance to sunlight, oils, and chemicals—provides excellent physical stability and long cable life. And the Polyethylene insulation on each wire assures high electrical and transmission qualities.

Thermoplastic cable is available in 19, 22, and 24 AWG —up to 404 pairs in concentric or unit construction. And it is backed by General Cable's 70 years of experience in manufacturing telephone cable. So when you think of plastic cable, think of General Cable.

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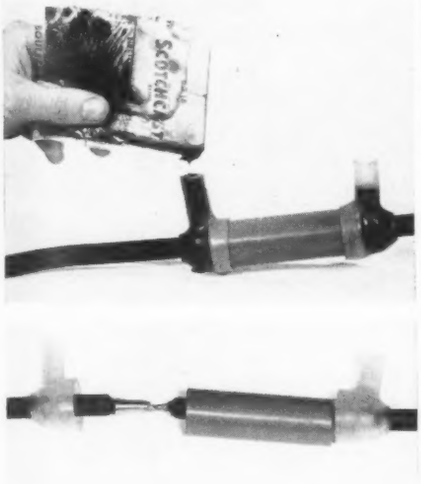
KIT FOR PLASTIC-JACKETED SPLICES—Factory-perfect cable splices under field conditions are made quickly and easily using a new splicing and insulating method, according to Minnesota Mining & Manufacturing Co., St. Paul, Minn., introducers of the new method.

No heat is required in the new method which involves embedding the splice in liquid epoxy resin that hardens into a hermetically sealed casting.

Used in convenient kit form, it allows the workman in the field to turn out a tough, plastic-jacketed splice in



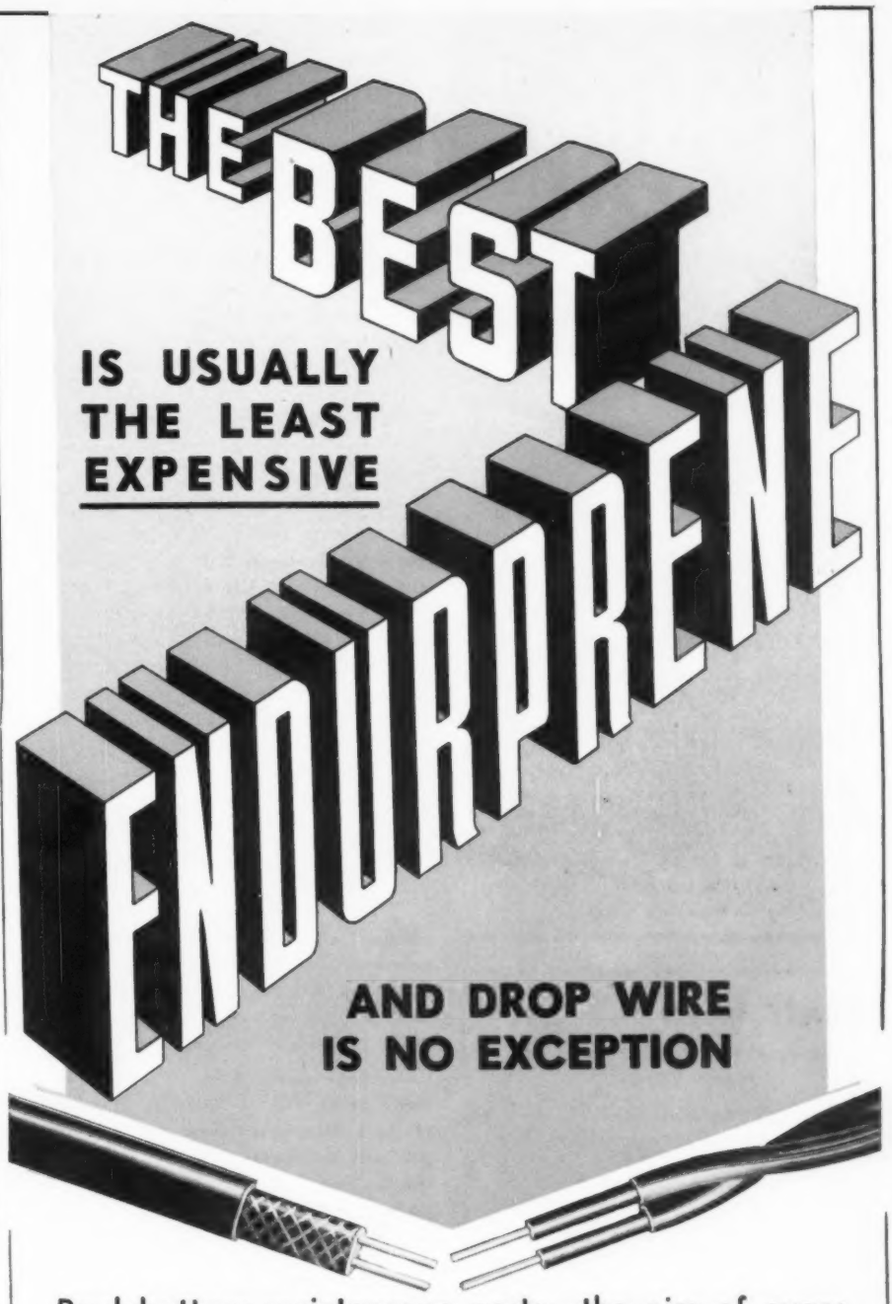
a matter of minutes, completely protected and insulated against moisture, corrosion and electrical leakage, states the company.

Basis for the new method is the firm's "Scotchcast" electrical embedment resin No. 4 now available in a unique, plastic mixing envelope—the "Unipak" container—which provides a virtually foolproof method for mixing resin and hardener in exactly the right proportions.

Previously industry's use of the epoxy-type resins with their high dielectric, excellent adhesion, and resistance to moisture, has been limited to the carefully controlled conditions of the manufacturer's plant where they have been used for embedding coils and other electrical components for critical applications.

However with the introduction of the new kit—"Scotchcast" splicing kit No. 82A—splices cast in epoxy resin can be made anywhere. As a result, the kit is expected to find wide usage throughout the entire electrical field wherever critical applications or difficult conditions demand an easily-made splice offering maximum protection.

Applications to date have included street and airport lighting cable, communications cable, and splices in insulated conductors above, and under-



Rock-bottom maintenance costs—the aim of every on-the-ball plant executive—come when you buy the drop wire that stays up, year after year, storm after storm.

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Trojan #27793 Electronic Tube Rectifier (Battery Eliminator) 24 volts DC, 3 amps., imput 105- to 125 volts AC, Complete, $99.50 each.

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Federal 101-B for signaling over any voice frequency circuit such as a carrier channel, radio link, through repeaters or composite ringing. Complete, Near New, $49.50 each.

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ground, as well as completely submerged in water.

All materials necessary for making a complete cast splice in single conductor cable from wire sizes 10 to 4 AWG are included in the kit. No tools are required other than a pocket knife, reports the company.

Each kit makes one complete splice and includes a supply of "Scotchcast" resin and hardener in the "Unipak" container; a three-piece vinyl plastic single-use mold; two different-sized "Scotchlok" electrical spring connectors; a strip of abrasive cloth for cleaning the conductor, and an instruction sheet.

In use, the mold pieces are slipped on the ends of the wire, the insulation penciled down, and the spring connector turned on with the fingers. After pulling the plastic mold units into place over the connection, the inner partition in the "Unipak" container is ruptured by squeezing, and the resin and hardener are thoroughly mixed by simply kneading the contents.

When the resin assumes a uniform color, a corner is snipped off the envelope and the activated resin poured into one of the spouts on the mold. The resin sets up within five to 15 minutes —depending on the temperature—the plastic mold is left in place, since it provides added protection. The entire operation takes from 10 to 20 minutes and backfilling may begin immediately after pouring if desired.

Average properties of the "Scotchcast" resin No. 4 used in the kit include a dielectric strength of 800 volts per mil thickness in 10 mil films; an electrolytic corrosion factor of 1.0; a dielectric constant and dissipation factor at 30 degrees C. of 7.2 and .019 respectively; and, good resistance to water, oil, solvents and weathering. The material is self extinguishing, states the company.

Additional information on the "Scotchcast" splicing kit No. 82A may be obtained. Request NP343.

• • •

OUTDOOR TELEPHONE BOOTH—At the recent United States Independent Telephone Association Convention in Chicago, Churchill Cabinet Co. introduced a new outdoor telephone booth.

This booth is the No. 500 Series in their line and has as a special feature a photoelectric Nitelighter that turns the light on at dusk and off at dawn. Other than the light, it is of the same construction as the No. 300 booth introduced last year and which is still in the Churchill line. It is of the same California redwood, has wire-reinforced

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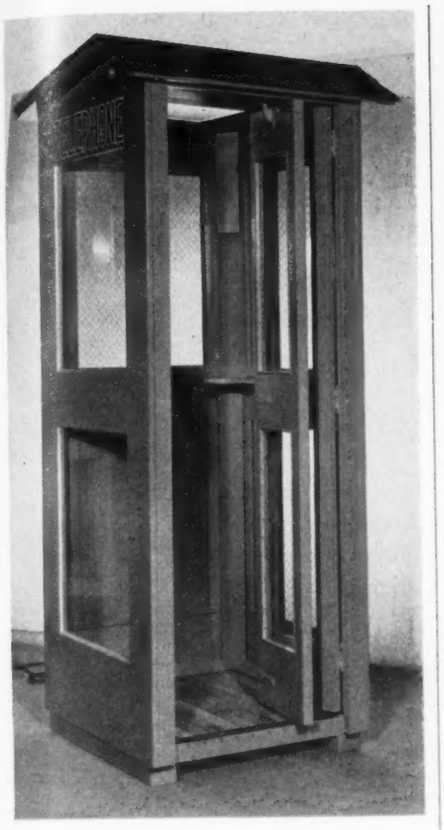

plate glass windows, oak floor, and folding doors.

With the addition of the Nitelighter the company feels that this new booth will meet all requirements of the Independents.

Churchill's No. 100 indoor telephone booth also has new features—a new rigidized metal lining in a very pleasing color, new ventilating system that changes the air in the booth completely every three minutes, and a new lighting fixture. Request NP344.

• • •

GAS DETECTOR—The Mine Safety Appliances Co. recently stated that in common with telephone companies in other cities, the Bell Telephone Co. of Pennsylvania is confronted with combustible gas hazards in underground service ducts and manholes and added that the company's method of combating such hazards is an example of modern safety technology.

Now standard equipment for cable splicers and service crew foremen of Bell of Pennsylvania are 200 portable combustible gas detectors, known as MSA Explosimeters, states the Mine Safety Appliances Co. These instruments are used to check the atmosphere of underground areas before any person is permitted to enter.

For instructions on how to enter, cable splicers and service people of Bell of Pennsylvania refer to "Bell System

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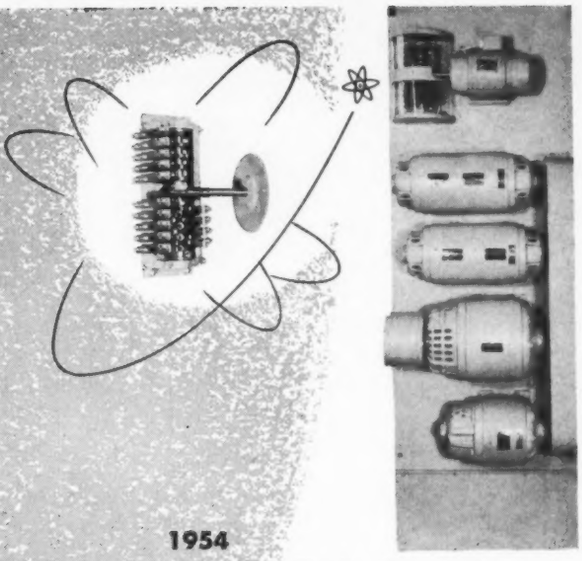
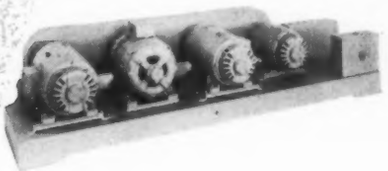


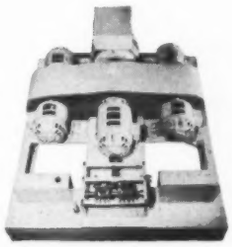
1954

Mar Vista, California. All connections at terminal board. Lubricated-for-life ball bearings throughout. Rugged, dependable construction. Equipped with coin controls — PLUS — A new and improved interrupter design. The pile-up is equipped with positive micro setting control of finger positioning. Another exclusive with ESCO



1951

Clarinda, Iowa. Simplified hook-up



1949

Oxnard, California.
Improved interrupter design

1947

Rochester, New York. A new, better motor generator set

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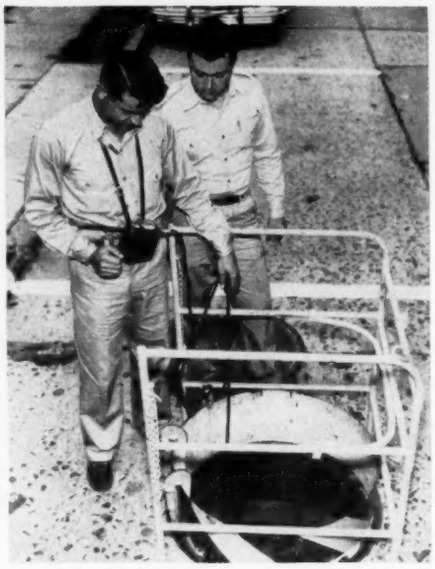

Practices" which spells out most safety problems and all the detailed how-to-do-it procedure necessary to guard against manhole and duct hazards.

Practices detailed in the Bell System manual embody standards for particular conditions and any unusual local situations that may require special attention.

Philadelphia provides an example of such a "local situation." Manufactured gas — with a characteristic and easily recognized odor—has been succeeded by a mixture of natural and manufactured gas for heating and cooking in many homes and business establishments. Because this "enriched gas" is more elusive to man's sense of smell, cable splicers and service crews rely on the Explosimeter to check the atmosphere, according to Sam McKay, safety director.

This instrument, a development of Mine Safety Appliances Co., is simple to operate. A sampling line is lowered into the opened manhole, and an atmosphere sample is drawn in to the instrument by an aspirator bulb. The sample then enters the filament chamber where it comes in contact with a filament which is part of an electric bridge circuit. Any combustible gas or vapors in the sample burns on the surface of this filament and increases its temperature. The resulting change in electrical resistance of the filament unbalances the bridge, causing electrical current to flow to the meter. The magnitude of the current flow is directly proportional to the percentage of combustible gas—up to the lower explosive limit in air—in the sample mixture. Request NP345.

• • •

GERMICIDAL PADS — General Scientific Equipment Co. announces that a simple wiping with a new disposable cloth wafer, impregnated with an active germicide harmless to human beings, sanitizes and deodorizes telephone

mouthpieces in a few seconds. The cloth pads, named tel-O-cide and packed in jars of 100, are recommended for regular telephone hygiene in offices, factories, or institutions of one to many hundreds of telephones.

General Scientific Equipment Co., distributor of tel-O-cide pads, emphasizes that moisture from the pad dries almost instantly on the mouthpiece and receiver, requiring no additional wiping to return the instrument to service after disinfecting.

Tel-O-cide pads are available in single jars of 100 pads; and in cartons of one dozen, two dozen, six dozen, or more jars. Request NP346.

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